



**FLYING FLYMOJO
AIR SHOW DEAL
SEES C-SERIES
TAKE OFF IN ASIA
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TAKING AIM

MBDA chief executive in pre-emptive strike as US protectionism threatens Brimstone campaign **19**

FLIGHT

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CANADA SPECIAL

VIKING OF THE SKIES

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COVER IMAGE

Of all the programmes to restart production of an old aircraft type, Canadian firm Viking's Series 400 Twin Otter has been arguably the most successful **P26**



BEHIND THE HEADLINES

Murdo Morrison (above) went to **Vancouver Island** to visit **Viking**, the company behind the reborn Twin Otter, as part of a grand tour of the country for our **Canadian special** (P26). **Greg Waldron** was in **Langkawi**, Malaysia for our **LIMA show report** (P22)



NEXT WEEK GA SPECIAL

For our General Aviation special report, we look at the European market, and get our hands on the Robin DR401

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now updated with enhanced data and in-depth market analysis

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IMAGE OF THE WEEK

Airbus Defence & Space has delivered the first of three C295 medium transports to the Philippine air force. The aircraft will carry out military and humanitarian relief tasks. Flightglobal's Ascend Fleets database records the service as also having three Lockheed Martin C-130s and two Fokker F27s in use.

View more great aviation shots online and in our weekly tablet edition:



Airbus Defence & Space

THE WEEK IN NUMBERS

2.5%

US Federal Aviation Administration

Average annual growth in passenger traffic on US airlines forecast for next 20 years, versus 2.2% recorded last year

330min

Flightglobal dashboard

New extended-range twin engine operational performance standards approved for Boeing's 747-8I by the US FAA

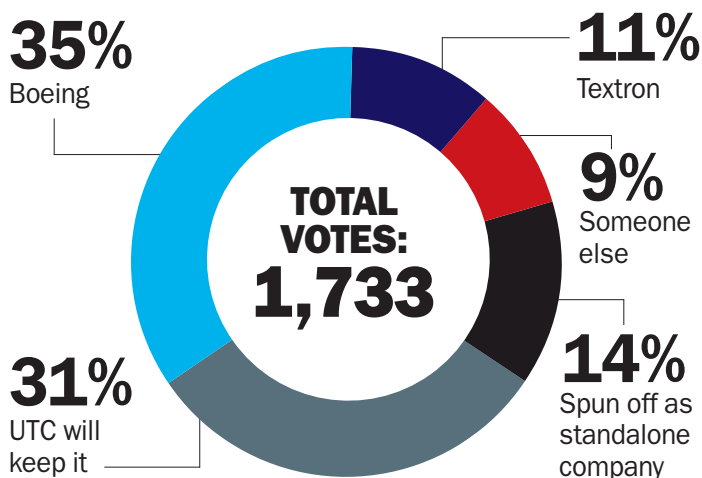
\$140m

Flightglobal dashboard

Pre-tax loss reported by Air Asia for 2014, with the carrier putting blame on overcapacity at rival Malaysia Airlines

QUESTION OF THE WEEK

Last week, we asked: **Who will buy Sikorsky?** You said:



This week, we ask: **Ryanair's proposed transatlantic service:**

- ☐ Will launch successfully within three years
☐ Will take a bit longer ☐ Will launch but fail ☐ Will never happen

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Shutting the doors

Despite its championing of the free market, a spirit of protectionism too often pervades the USA: witness the hostility to Gulf airlines and foreign defence firms trying to sell their wares

The home of the free market has always had an ambivalent attitude to foreign competition, from Japanese cars threatening Motor City in the 1970s to cheap imports squeezing farmers. The USA may be a consumer paradise, where ordering a pizza requires a baffling array of choices – but the customer sometimes takes second place when American jobs are at stake.

Ugly protectionism is rearing its head in aerospace – on two fronts. First, there is the bid by three US airlines to prevent their Gulf counterparts luring Americans with – heaven forbid – a better product. Emirates, Etihad and Qatar Airways, they say, can do this because they receive backdoor help from their governments.

Second, there is the lobby to stop the US Air Force selecting MBDA's Brimstone, a more capable air-to-ground alternative to the Hellfire, and, unlike a possible US replacement, available now. Despite the European missile house's proposal to move production and design author-

Protecting American jobs by restricting competition means a rawer deal for the customer

ity to its US unit, MBDA fears it will be rejected, mainly for being viewed as foreign (or, worse, French).

The case made by the US airlines and their union backers is flimsy, and reminiscent of the mood 40 years ago as Americans swapped gas-guzzling Buicks and Fords for Toyotas and Hondas. The Japanese, who had finessed mass automotive production and paid their workers less than Detroit, were accused of dumping. This time, Gulf governments are damned for underwriting their flag-carriers because, for example, they don't recognise unions and can pay their staff less, and



Coming over here, taking our jobs

because they have invested in giant desert hubs that are cheaper to use for their airlines – and everyone else – than big airports in North America or Europe.

No-one pretends the sheikhdoms and their carriers do not share a mutual interest. In each case, airlines are state-owned and tools for driving economic growth. But what the Gulf carriers are really guilty of is devising a clean-sheet business model, based on exemplary customer service on new aircraft, and hubs at the crossroads of the world's main trade routes.

On the defence side, while security concerns will always entail some domestic protectionism, the import door is rarely ajar for the USA's allies – all of whom buy equipment from US contractors. Witness recent failures: the US101 presidential helicopter, a no-bid for an Air Force One replacement, the Airbus A330 tanker.

In these cases, protecting American jobs by restricting competition means the American customer – whether the Texan travelling to Thailand or the air force chief seeking best-value equipment – gets a rawer deal. ■

See This Week P9, Defence P19

Now the future, Finmeccanica

Has Finmeccanica turned the corner? At the risk of tempting fate, all the indicators say it's time to drop the modifier "troubled" when referring to Italy's aerospace champion and start talking about profits and growth – and the bold moves they might enable.

Nothing has come easily, but a sound course charted in response to a disastrous 2011 has been followed and refined, to the point that Finmeccanica is genuinely looking like a new company. Core businesses are in solid profit, the crippling India bribery scandal has been leveraged into a transformative blueprint for honest, effective corporate governance and the key AgustaWestland helicopters division might reasonably claim to be leading all rivals.

Debt remains stubbornly high – paying-down efforts are being offset by a deteriorating euro-dollar exchange rate – but cash generation expectations are strong so that cloud, too, is lifting.

Chief executive Mauro Moretti, appointed last year by a new Italian government determined to show steel when it comes to reform of state-controlled companies, owes much to the efforts of his predecessors Alessandro Pansa and Giuseppe Orsi. But Moretti deserves credit for completing a radical restructuring.

He knows that job isn't finished, but he has made it clear that it is also time, finally, for Finmeccanica to start building its future. ■

See This Week P8



To read our in-depth analysis on the escalating Gulf and US carrier dispute, go online at flightglobal.com/openskies



BRIEFING

UKRAINE SEEKS NEW AEROSPACE LEADERS

VACANCIES Ukraine's ministry for economic development and trade has invited applications by 2 April from candidates to manage state-owned Antonov and the Kharkov State Aircraft Manufacturing Company. Applicants should have at least 10 years' managerial experience at non-Ukrainian manufacturers, or domestic enterprises that trade abroad. Responses will be considered by 29 May.

ATR EXPANSION FOR AIR MADAGASCAR

FLEET Air Madagascar has received the first of two ATR 72-600s leased from Irish company Elix Aviation Capital, with the other to be delivered in April. The carrier, which has been an ATR operator for about two decades, has also signed a purchase agreement worth \$77 million to acquire another three -600s, for delivery from 2017.

SOLAR IMPULSE 2 REACHES MANDALAY

ENDURANCE The Solar Impulse 2 team celebrated the completion of the round-the-world venture's fourth flight on 19 March, when the solar-powered aircraft touched down in Mandalay, Myanmar. The almost 760nm (1,400km) flight from Varanasi in India lasted 13h 29min, the team says. Flown from the Indian city of Ahmedabad, the record-breaking design's third sortie took 15h to complete.

FREE HULL LOSS COVER FOR ROPS USERS

INSURANCE Zurich-based insurer Allied World Europe is offering complimentary aircraft hull insurance to airlines that opt to fit the Airbus runway overrun prevention system (ROPS). "We see ROPS as an integral tool in reducing the frequency of aircraft accidents, and believe that this unique product will eventually benefit not only airlines and their passengers but also insurers," says Olivier Marre, Allied World's senior vice-president, aviation. ROPS is in operation on approximately 200 aircraft, including the A320, A350 and A380.

TURKEY AXES RECONNAISSANCE PHANTOMS

FLEET The Turkish air force made its last sortie with a McDonnell Douglas RF-4E reconnaissance aircraft on 12 March, retiring the type following a twin fatal accident near Malatya/Erhac air base late the previous month. Four crew members were killed when the two aircraft crashed near the base while making a night-time approach in cloud. Lockheed Martin F-16s carrying UTC Aerospace Systems DB-110 digital reconnaissance pods will assume the RF-4E's tasks.

UTAIR LOOKS TO SHIFT STORED 767S

DISPOSAL Russian carrier UTair is looking to sell four of the Boeing 767-200ERs it acquired from Continental Airlines between 2012 and 2013. Gaztech Leasing, which owns the four units, has appointed Avinco as the exclusive remarketing agent for the sale or lease of the aircraft. Built in 2000 and 2001 and with a 170-seat capacity, the 767s are powered by General Electric CF6 engines.

MALAYSIAN HELICOPTER BUYS ANNOUNCED

ROTORCRAFT Malaysian firm Aerial Power Lines used the LIMA show in Langkawi to sign an order for two Airbus Helicopters H135s for emergency medical services duties. It has options for six more of the type, plus two H175s. Malaysia's ESB Aero Club also signed a letter of intent to buy three Bell Helicopter Jet Ranger X trainers, while Weststar General Aviation signed for single examples of the AgustaWestland AW119Kx, AW169 and GrandNew.

See Show Report P22



787 structures work earned the group €300 million last year

PROFIT DAN THISELL LONDON

Restructure relief for Finmeccanica

Italian giant reports significant turnaround as deal to sell last major non-core business narrows focus to key sectors

Finmeccanica looks to be rising out of a five-year slump, with 2014 figures showing its first positive net result since 2010 and a strong performance in its aerospace and defence core.

Coming just weeks after Hitachi agreed to buy Finmeccanica's last major non-core business, the AnsaldoBreda rail rolling stock company, the €70 million (\$75 million) profit before exceptionals marks a turnaround of more than €700 million from the €649 million loss chalked up in 2013.

The €810 million Hitachi deal will complete the AgustaWestland and Alenia Aermacchi parent's long-running plan to sell off troubled bus, rail and energy businesses, and cut a burdensome €4 billion corporate debt by €600 million. But for chief executive Mauro Moretti, the shining figures are in the core businesses that are the company's future. There, profit rose by nearly a quarter to €833 million, on sales which were up by almost 10% to €11.1 billion.

Moretti, appointed last year by the incoming Italian prime minister Matteo Renzi in a sweep of management at state-controlled firms, told analysts that "change is already happening", and vows to be "fully committed and personally involved" in what he calls a "radical mission change". Under-scoring the significance of a strategy outlined in January, Moretti said

Finmeccanica's shift from being a financial holding company overseeing semi-independent businesses to a focused aerospace and defence group is well under way, and execution is now the top priority.

This strategic plan to improve management and focus on aerospace was outlined by then chief Giuseppe Orsi following a disastrous 2011, which saw a net loss of more than €2.3 billion on heavy losses in power, road and rail, and a €750 million write-down against defects in fuselage sections and horizontal stabilisers supplied for the Boeing 787.

Subsequent woes included allegations that AgustaWestland paid to win a lucrative VVIP helicopters sale to India. The scandal cost Orsi his job, although he was later found not responsible.

Today, however, AgustaWestland is on a roll, accounting for half of group profit. The AW189 achieved certification in 2014, and the AW169 is set to achieve the same feat soon. And although Moretti says 787 structures work – which earned Finmeccanica €300 million last year – still has to "be faster", output has been rising.

Volume improvements are also being made in support of the Eurofighter and Lockheed Martin F-35 programmes and on Alenia Aermacchi's M-346, as well as at ATR, the regional turboprop joint venture with Airbus. ■



Delayed AW189 ready to enlist in Bristow SAR role
THIS WEEK P10

LIBERALISATION GHIM-AY YEO WASHINGTON DC

Deepening gulf of opinion in open skies subsidy dispute

Emirates and Etihad respond to US carriers' allegations they receive government support

The bosses of two of the big three Gulf carriers have again defended their expansion strategies into the USA, despite facing mounting opposition from the country's major airlines.

Emirates Airline president Tim Clark says the Dubai carrier will continue its push to serve as many as 20 US cities, as a pressure group backed by Delta Air Lines, United Airlines and American Airlines, as well as pilot unions, lobbies Washington DC to re-examine open skies deals with the United Arab Emirates and Qatar.

"We intend to progress with that," Clark said at a press briefing in the US capital on 17 February. "We don't see any retardation in what we are doing."

Emirates currently serves nine cities in the USA, with more than 80 flights a week. It carried 2.4 million passengers to the USA in 2014.

Emirates, Qatar Airways and Etihad Airways have been accused by the three US legacy carriers of receiving more than \$40 billion in state subsidies from their governments. The US airlines say these subsidies flout open skies agreements and give Gulf carriers an unfair advantage.



US airlines suggest that Emirates' A380s are operating at a loss

The three US airlines allege that the subsidies allow the Gulf carriers to operate large widebodies such as the Airbus A380 and Boeing 777 at a loss.

Clark denies this, insisting there is passenger demand for large aircraft like the A380. Emirates operates its A380s, which are configured for more than 500 passengers, to New York John F Kennedy, Dallas/Fort Worth, Houston Intercontinental, Los Angeles and San Francisco.

Delta, American and United produced a 55-page white paper earlier this month that outlines the alleged subsidies received by the Gulf carriers.

Etihad chief executive James Hogan also defended his carrier's transatlantic business strategy, in his first comments on the row.

"Our shareholder has provided equity and investment; they've invested and seen success," he told a US Chamber of Commerce aviation summit in Washington DC. "That's business."

Asked if the Abu Dhabi carrier had violated the UAE's open skies agreement with the USA by benefiting from state subsidies, Hogan replied: "That's for the two governments to discuss." ■



To read a full analysis of the escalating dispute, go online at flightglobal.com/openskies

DEVELOPMENT GREG WALDRON LANGKAWI

Indonesia sees commercial use for aged CN235

Indonesian Aerospace is considering developing a commercial N245 variant of the CN235 medium transport, which could carry 35 to 50 passengers on short, regional segments.

"It would be a spoke-to-spoke aircraft," director of production Arie Wibowo told Flightglobal at the Langkawi International Maritime and Aerospace exhibition in Malaysia.

The company believes it could produce two prototypes by 2017-2018 for between \$200 million and \$250 million, with the funding to come from the Indonesian government.

Indonesian Aerospace says creating a commercial variant of the CASA-developed CN235 would involve re-designing the tail empennage to remove the type's cargo ramp. A desire to operate the model at up to 25,000ft would also require replacing its current General Electric CT7 engines with the Pratt & Whitney Canada PW127s used on the stretched Airbus C295.

The company believes the N245 would fill a niche between its developmental N219 – which targets the segment now served by the Cessna Caravan and de Havilland/Viking Twin Otter – and ATR-series turboprops. ■

PROGRAMME MAVIS TOH SINGAPORE

ARJ21 lifts off on six-month route-proving campaign

Comac has started a six-month route-proving campaign for its ARJ21-700, as the programme moves towards delivering its first aircraft to launch customer Chengdu Airlines.

Comac conducted a flight on the Shanghai-Tianjin route with aircraft B-010L on 16 March, carrying company executives and members of the local media.

Nantong Xindong airport and Chengdu Shuangliu International airport are the bases for the route-

proving flights. Comac says services will be operated to Tianjin, Beijing, Wuhan, Nanjing, Fuzhou, Guiyang and Changsa, to simulate routes that the type will serve.

The flights are necessary to ensure that all systems on the aircraft can work safely together in real time. It will also help Chengdu Airlines' flight crews

become familiarised with the flight manual and its cabin crew with flight training, in preparation for formal delivery.

ICBC Financial Leasing earlier this month became the latest customer to commit to the indigenous Chinese aircraft, with a 30-unit purchase agreement. The ARJ21 received type certification from the Civil Aviation Administration of China on 30 December 2014, more than 12 years after the programme was launched. ■



Chengdu Airlines is the launch customer for the Chinese-made jet



ORGANISED LABOUR STEPHEN TRIMBLE WASHINGTON DC

Rivals prepare to repel union drive

Big two manufacturers plan to combat recruitment efforts by workforce associations at new factories in southern USA

Airbus and Boeing are both gearing up for possible battles with unions at their respective new factories in the south of the USA.

For its part, Airbus already has developed a strategy to counter an expected move by labour unions to organise the A320 final assembly line that will open later this year in Mobile, Alabama.

"I don't think there's any question that organised labour will want to try to approach our employees there," Alan McArtor, chairman and chief executive of Airbus's US division, tells *Flight International*.

Airbus selected the Brookley Field complex in July 2012 to establish the A320 programme's fourth final assembly line, following others in Toulouse, Hamburg and Tianjin. Added "labour flexibility", compared to that at its European sites, was given as one reason for the decision, but the company has also said that the new US line can help to improve its balance sheet by delivering aircraft from closer to a growing list of customers in North America.

Meanwhile, the International Association of Machinists and Aerospace Workers (IAM) has targeted Boeing's workforce in North Charleston, South Carolina, where it established a final assembly line for the 787 shortly after a 2008 strike by union la-

bour in the Puget Sound area. The IAM – which had opposed Boeing's expansion in South Carolina – petitioned the National Labor Relations Board on 16 March to allow workers to vote on whether to organise.

The union says a "significant number" of Boeing employees have signed authorisation cards voicing interest in union representation, and that workers had contacted it regarding "numerous workplace concerns, including forced overtime, fair wages and a lack of respect on the shop floor".

Boeing and the state government have tried to dissuade workers against organising in a union.

Since January, the IAM has also moved to highlight its presence in Alabama, where it already represents aerospace workers employed by Boeing, L-3 Communications and the United Launch Alliance. The union launched a new web site, AlabamaAero.org, specifically calling out the \$160 million in tax breaks and incentives to Airbus as "corporate welfare".

"Usually, if a company gets a union it basically deserves it. They failed to create an atmosphere and communications link with employees," McArtor says. "I think unions are unnecessary if you have the right kind of rapport and communications and fair treatment of your employees." ■



AgustaWestland

The SAR-configured AW189 is belatedly being assembled in the UK

HELICOPTERS DOMINIC PERRY LONDON

Delayed AW189 ready to enlist in Bristow SAR role

The first UK-assembled AW189 configured for search and rescue operations appears to be just days away from delivery by AgustaWestland.

Destined for operator Bristow Helicopters as part of its new UK SAR operation, all 11 AW189s for use on the contract were due to have been built at the manufacturer's Yeovil facility in Somerset. Development and certification delays meant that the initial example – which was handed over in late 2014 and is currently being used for training at Bristow's Norwich base in Norfolk – was fully assembled in Italy.

The first UK-built model is "ready for customer acceptance", says the airframer, with the milestone likely to take place "in the coming days".

Late delivery has led Bristow to adopt a contingency plan to initially use Sikorsky S-92s instead of AW189s in Inverness, Scotland: one of two bases which will become active on 1 April under the UK SAR contract.

AgustaWestland now has seven of the eventual 10 UK-assembled aircraft on its production

line. Another two examples, also to be completed in Yeovil, were recently ordered by US firm AAR Airlift, for use on a SAR contract covering the Falkland Islands.

AgustaWestland continues to pursue other opportunities for the 8.6t SAR variant of the AW189, with a requirement from Hong Kong's Government Flying Service to replace its older Airbus Helicopters types high on its priority list.

The Anglo-Italian airframer also is to offer a higher gross weight variant of the rotorcraft for the oil and gas market. This gains an extra 300kg (660lb) of payload, and an additional belly fuel tank.

"The fuel system has been certificated by EASA, so if another operator wants to pick it up for offshore work where they need extended range, then it's available," AgustaWestland says.

The manufacturer has, meanwhile, played down a problem affecting AW189s already operated by Bristow on oil and gas missions. Cracking of internal panels in the cabin led to the aircraft being temporarily removed from service in early March while the affected parts were replaced. ■



Airbus

A visiting A350 checks out assembly site progress in Alabama



Out with the old as Biman looks to double fleet size
AIR TRANSPORT P12

REGULATION DAVID LEARMOUNT LONDON

EASA makes safety reform proposals

Under-resourced national authorities should have option to delegate some oversight functions, European agency suggests

Following broad consultation with national aviation authorities, EASA has published proposals for a more flexible and responsive way of managing safety oversight in Europe.

When national aviation authorities lack resources or expertise, they should be able to delegate some of their oversight functions to other authorities or to EASA, says the agency.

The proposal also suggests that member states could, on a voluntary basis, ask it to oversee their state aircraft, excluding military fleets. At present, such assets are in a form of limbo in some nations, where they are overseen by neither the military nor the civil aviation authority, or are carrying out civilian tasks while overseen by the military.

The proposals also include the extension of the agency's scope for safety oversight intervention in new domains, such as airport ground handling, remotely piloted air systems and security. This would address concerns recently outlined to *Flight International* by EASA executive director Patrick Ky.

"EASA – that means the agency and its sister national authorities – needs to be prepared for the challenges ahead. With these changes, we will be more proportional, flexible and proactive to increase the level of safety in European aviation," Ky explains in an EASA Opinion.

The opinion is to be sent to the European Commission, which will use it as one of its expert inputs while it works on amending the agency's current Basic Regulation, planned by end-2015. ■



Oversight of state aircraft such as this French A330 is a grey area

CONTRACT

German research consortium set to assess cabin air quality

EASA has awarded a research contract to a German consortium made up of research establishment Fraunhofer and the Medizinische Hochschule Hannover to research cabin air quality.

The agency says the activity will start with in-flight work to identify suitable instrumentation to measure contamination, before advancing to a test programme on board commercially operated large transport aircraft in the near future.

Measurements will be taken in the cockpit and passenger cabin during all flight phases, with the project scheduled to take 20 months to complete and results expected in October 2016.

"The quality of the air that passengers and air crews are exposed to on board commercial transport aeroplanes has been the basis of a continuing debate over the last 60 years, both from the health and safety points of view," EASA said

when it made the initial call for research bids.

It adds: "Discussions about cabin or cockpit air quality need to differentiate between single cabin/cockpit air contamination [fume] events and the cabin air composition in normal operating conditions, for example the composition of the cabin air in the absence of any abnormal event and which can be compared, for instance, to the composition of the outside air or to the air at other workplaces." ■

DELIVERY GREG WALDRON LANGKAWI

Malaysian A400M lifts Red Cross relief hopes

Airbus Defence & Space has highlighted the suitability of its A400M tactical transport as a humanitarian relief aircraft, as Malaysia's first example made a high-profile debut at the Langkawi International Maritime and Aerospace (LIMA) exhibition.

During a media briefing at the show, representatives from Airbus and the International Federation of the Red Cross (IFRC) and Red Crescent discussed the nature of airborne disaster relief missions.

The IFRC says it operated 21 full-aircraft humanitarian charters in 2013, with types used having included A340-600 and Boeing 727, 747 and 777 aircraft.



The nation's first Atlas made its debut during the LIMA exhibition

During that year, 73% of humanitarian aid was sent by sea, 16% by air and 11% by road, it adds.

One priority for the IFRC in the early days of a crisis is to dispatch standardised packages of personnel and equipment named emergency response units (ERU).

Each being self-sufficient for one month, an ERU supports relief efforts in areas such as logistics, water treatment, sanitation and medical care.

According to the IFRC, an A400M has the capacity to carry two full units.

Airbus says an A400M departing Kuala Lumpur would be able to carry a full 37t cargo load to the Philippines, southern China, or most of Indonesia. If the load is cut to 20t, the aircraft could fly as far as the horn of Africa, or reach most of Australia or Japan, before landing on a runway of between 1,000-1,500m in length.

The Royal Malaysian Air Force's first A400M took part in the show's opening ceremony on 17 March, following its transfer from Seville, Spain by an Airbus crew. The service is due to receive the three remaining A400Ms it has on order by the end of 2016. ■
See Show Report P22

CAPACITY OLIVER CLARK LONDON

Protect UK's domestic slots say experts

Up to 15% of the capacity of any new runway built in the southeast of England should be ring-fenced for domestic flights to protect UK regional connectivity, a panel of experts has recommended.

In its new report, the National Connectivity Task Force argues that, irrespective of whether a new runway is approved for London Gatwick or Heathrow by the Airports Commission, the government must "require the promoter" of any additional capacity to set aside 10-15% – or 70-110 slots – between 2025 and 2040, and dedicate them for regional flights to London.

The task force calls for a "binding mechanism" that would allow an airport operator to release a given amount of new capacity each season "solely tied to the use of stands on one (or more) specifically allocated and internally designed domestic piers". ■

REQUIREMENT AARON CHONG SINGAPORE

Out with the old as Biman looks to double fleet size and grow network

Biman Bangladesh Airlines is working towards doubling its fleet size by 2020, as it replaces its older aircraft.

In an interview with Flightglobal, Biman's managing director and chief executive Kyle Haywood says that the airline is in the process of increasing its fleet size "by 100%" from the current 10 aircraft. Flightglobal's Ascend Fleets database shows the airline's fleet comprises two Airbus A310s, two Boeing 737-800s, two 777-200s and four 777-300ERs.

Haywood says that two Bombardier Dash 8 Q400s will

"We are working on this project and in six years, the average age of the fleet will be in single digits"

KYLE HAYWOOD

MD & CEO, Biman Bangladesh Airlines



The carrier has four 777-300ERs and is currently sourcing another

join Biman's fleet by late March, and will be used to serve an expanded domestic and regional network from April onwards.

Haywood adds that Biman is also currently sourcing one 777-300ER and an additional 737-800, each to enter the fleet by August "to support further international growth".

In addition, Haywood believes that the airline has a further need for up to five Boeing 737s on top of its existing fleet to begin operations "over the next 36 months".

"We are currently working on this project and in six years, the average age of the fleet will be in single digits," he adds. ■

PROGRAMME STEPHEN TRIMBLE WASHINGTON DC

Bellemare warns on CSeries schedule

Bombardier's new chief executive says he is looking at possible risks to planned timeline for CS100's entry into service

Five weeks after becoming Bombardier's new chief executive, Alain Bellemare says he is assessing potential changes to the scheduled certification date of the CSeries aircraft family.

"We might have a little bit of schedule impact in terms of certification that I'm trying to assess," Bellemare said in an interview on the sidelines of the US Chamber of Commerce Aviation Summit in Washington DC on 17 March, where he spoke on a panel of manufacturing executives.

Bombardier currently plans to certificate and deliver the first 110-seat CS100 in the second half of this year, Bellemare says, but adds that a delay anywhere in the supply chain could impact the overall schedule.

The CSeries flight test programme now includes four CS100 aircraft and the first CS300. The fifth CS100 has received a flight test permit and is expected to join the flight test programme any day.

Bombardier announced on 9 March that the programme had passed the halfway point of the testing schedule. So far, the test results show that the aircraft is meeting the company's fuel-saving promises, Bellemare says.

Bombardier has also received a recent lift by gaining a commitment on 17 March from Malaysian start-up carrier Flymojo to buy up to 40 CS100s. That letter of intent was signed only days after another potential customer, Lufthansa subsidiary

Austrian Airlines, passed on a chance to buy the CSeries.

As part of Bellemare's review of the programme, Bombardier will consider filling possible leadership "gaps" in the sales and marketing team for the CSeries, he says.

"The CSeries has created a shadow over the performance of the entire Bombardier business," Bellemare says. "Once we get that on a better track I think we're going to start seeing the sun. Right now, it's pretty cloudy."

As a former Pratt & Whitney Canada and Hamilton Sundstrand executive, Bellemare is concerned by the market perception of Bombardier's business value.

"It's a \$20 billion business today with a market [capitalisa-

tion] of four-and-a-half [billion]" Bellemare says. "Something doesn't compute there."

Bombardier announced in February that it was seeking ways to participate in industrial consolidation. That policy continues to be an option for both the company's train manufacturing business and its commercial aviation business, Bellemare says.

Much of the company's business jet portfolio remains attractive, he adds, with one possible exception.

"I know Challenger is strong, I know Global is strong," he says. "Learjet? I need to spend some time thinking about it." ■

See Show Report P23, Feature P30



**Rex reacts to
Newcastle
runway error**
AIR TRANSPORT

STRATEGY OLIVER CLARK LONDON

Ryanair eyes long-haul aircraft order

Irish carrier in discussions with manufacturers to purchase transatlantic fleet as board approves flights to US destinations

Ryanair is in talks with manufacturers with a view to ordering long-haul aircraft after its board approved plans to begin transatlantic flights.

The Irish carrier will not provide details of the discussions but says it plans to operate “low-cost flights” from 12-14 European cities to 12-14 US destinations.

“European consumers want lower-cost travel to the USA, and the same for Americans coming

to Europe. We see it as a logical development in the European market,” Ryanair says.

The Dublin-based carrier adds that its transatlantic business plan is “dependent on attaining viable long-haul aircraft – we estimate that’s four to five years away”.

Flight International first revealed details of Ryanair chief executive Michael O’Leary’s ambition to launch a no-frills transatlantic airline eight years ago.

The plan, which O’Leary disclosed in an interview in April 2007, was for the airline to operate independently of Ryanair with O’Leary expecting to lease or buy a fleet of up to 50 Airbus A350s or Boeing 787s after forecasting that oversupply would cause prices to dip at the turn of the decade. ■



Read about O’Leary’s original 2007 plan at: flightglobal.com/ryanairtransatlantic



O’Leary: international ambition

ROUTES OLIVER CLARK LONDON

Comair wins contract to fly to St Helena

Comair has won a contract to provide air services to the South Atlantic island of St Helena once the airport there is completed in 2016.

The South African carrier says it will operate weekly flights to Johannesburg with a Boeing 737-800 after winning a government tender to become the British Overseas Territory’s official carrier.

“Through Comair’s partnerships the St Helena air service will offer connections to international routes via Johannesburg, to destinations such as London, Paris, Sydney and Hong Kong,” says St Helena’s government.

An international airport is being built on the island by South African company Basil Read.

Comair flies as low-fare airline Kulula and operates as a franchise partner of British Airways within South Africa. ■



Comair operates as Kulula in South Africa as a partner of BA

AIRPORTS DAVID KAMINSKI-MORROW LONDON

Extra €1.1bn to finish Brandenburg

Shareholders have agreed to provide €1.1 billion (\$1.2 billion) in funding to complete construction at the beleaguered Berlin Brandenburg airport.

These funds are mainly needed to address problems with the fire-prevention and smoke-removal systems – the main cause of the high-profile delays to the airport’s commissioning – as well

as building work on the terminal and runway refurbishment.

Members of airport operator FBB’s supervisory board discussed construction costs totalling €5.4 billion last week. Board chair Rainer Bretschneider says the additional €1.1 billion required “will be made available” through capital contributions from the airport company’s shareholders.

Three shareholders own FBB: the federal German state has 26% while the states of Brandenburg and Berlin each have 37%.

Brandenburg airport had been just a few weeks away from opening in June 2012 when the problems with the fire system became apparent, forcing a postponement that has since cascaded into years of delays. ■

PROTOTYPE

An-178 freighter readied for tests

Antonov is intending to roll out the first An-178 freighter prototype next month, as work proceeds on a second example. The aircraft is a cargo version of the An-148 and An-158 passenger twinjet family.

Antonov states that assembly of the initial An-178 is “being finished” and that the type will be rolled out in April.

More than 100 personnel have been trained, it says, in order to conduct the engineering and flight-test programme for the aircraft.

Antonov has received interest in the freighter from Middle Eastern operator Maximus Air.



SAFETY ELLIS TAYLOR SINGAPORE

Rex reacts to Newcastle runway error

Details of 2012 building misidentification incident by Saab 340B crew prompt carrier to bolster human factors training

Australia's Regional Express (Rex) has added more material to its human factors training after an incident where crew misidentified a coal terminal as the runway at Newcastle airport in Williamstown, New South Wales.

The event occurred on 8 November 2012 at around 19:31 local time, and involved a Saab 340B, registered as VH-TRX, with three crew and two passengers on board. The crew reported that cloud cover to the west made conditions darker during the descent.

According to a report by the Australian Transport Safety Bureau, the aircraft was on a scheduled flight from Sydney to Newcastle. Although the flight was conducted under instrument flight rules, after reporting "visual" of the runway, the crew were cleared for a visual approach to runway 12 at Newcastle and ordered to contact the tower at 10nm (19km) from the airport.

As the first officer was flying the descent, the captain noticed buildings believed to be the airport, and provided the first officer with tracking guidance for a visual approach. The captain later reported misidentifying the buildings, which were part of a coal loading facility around 6nm from the airport.



Regional Express relies on Saab 340s for more than half its fleet

At around 7nm from the runway, the crew executed a left turn onto an apparent downwind leg, and levelled off at a circuit height of 1,500ft. Around the same time, an air traffic controller in the tower observed the aircraft "at a

greater distance than usual" from the runway.

"The [first officer] reported not being confident that he was observing the runway at Williamstown and also recalled seeing the distance measuring equipment

[DME] showing the aircraft to be about 6nm from the airport at that time," the ATSB says.

But as the captain was more familiar with the approach, the first officer did not advise the captain about the DME distance or his uncertainty about the aircraft's position.

Soon after, the tower contacted the crew to ask if they were still visual, to which the crew responded that they had lost the runway but were still turning right. After the first officer was still unable to sight the runway, he handed over control to the captain.

With the assistance of the tower and approach controllers, and after the intensity of the ground lighting was increased, the captain was able to execute a number of changes and make a successful landing. ■

ASSETS DAVID KAMINSKI-MORROW LONDON

Turboprops returned as Saab gets out of leasing business

Sweden's Saab Group has ended its involvement in the aircraft leasing business after divesting and returning the remainder of its turboprop portfolio.

Its wholly-owned Saab Aircraft Leasing subsidiary had been a vehicle for managing Saab 340s and Saab 2000s.

Although Saab opted, at the end of 1997, to discontinue the types' manufacture, it retained some 300 aircraft within its leasing business.

But it has gradually whittled down the size of this portfolio with a view to exiting in 2015.

The company's newly released annual report confirms that Saab

has "terminated its regional aircraft leasing operations".

Saab's portfolio comprised aircraft which it both owned and held on operating leases.

But last year it divested its 14 outstanding owned aircraft and, in January this year, the leases on six remaining aircraft expired. ■

MODIFICATIONS EDWARD RUSSELL WASHINGTON DC

Split scimitar winglets to cut Delta 737 fuel costs

Delta Air Lines is adding split scimitar winglets to the majority of its Boeing 737-900ER fleet, joining other US carriers in seeking the consequent additional fuel burn savings.

The Atlanta-based carrier plans to install the winglets on about 70 of its 737-900ERs, it says.

The first Delta aircraft with the winglets has entered service, after installation by Delta TechOps fol-

lowing delivery from Boeing at the end of February.

The Aviation Partners Boeing winglets will reduce fuel consumption by up to 2%, the company has said. Delta does not immediately plan to retrofit the winglets on its other 737 aircraft.

Alaska Airlines, Southwest Airlines and United Airlines are all installing split scimitar winglets on their 737 fleets. ■



The airline plans to install the winglets on about 70 737-900ERs

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SUPPLIER

Kawasaki fires up autoclave to support 787

Kawasaki Heavy Industries (KHI) has opened a new autoclave facility in Nagoya, Japan, to support production of the Boeing 787 composite structure.

The new facility has been designed to support production of the larger 787-9 and 787-10 models, KHI says.

KHI builds the composite-skinned forward fuselage, the landing gear storage unit and the wing fixed trailing edge for all three 787 variants.

The 60,000m² (646,000ft²) facility includes a 9m (30ft)-diameter autoclave and a prepreg automatic laminating machine.

Boeing is producing the 787 at a rate of 10 per month, but the airframer plans to increase output to 12 per month in 2016 and subsequently to 14 per month by the end of the decade. ■



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CAPACITY DAVID KAMINSKI-MORROW LONDON

Regulations allow modified 195-seat A320, says EASA

March update to type certification opens door to increase, but further approval still needed

European regulators have disclosed that the Airbus A320 can potentially be modified to increase capacity to 195 seats.

EASA's update to the type certificate of the aircraft, dated 6 March, highlights a modification enabling the increase in seating.

It says the modification "defines a virtual envelope" for the layout of passenger accommodation.

But EASA points out this "does not constitute an authorisation" to install more than 180 seats, the limit for the standard A320.

"A separate approval is needed for the installation of the individual customised cabin layout and the necessary cabin adaptations up to 195 seats," adds EASA.

The disclosure preceded the delivery of Spanish budget airline Vueling's first A320 with Airbus's Space-Flex concept, which



Airbus's Space-Flex concept enabled a 186-seat A320 for Vueling

enables the type to increase its seat count to 186.

Vueling is the first customer to benefit from the new exit limit, says Airbus. Part of the carrier's 2013 order for 62 A320-family jets, the aircraft, MSN6483, has the Space-Flex configuration, which increases available capacity at the rear of the cabin.

Airbus has been working on concepts to raise the seating ca-

capacity of the A320 family, through a combination of interior reconfiguration and changes to the exit doors.

Rival Boeing, whose 737-800 model is limited to 189 seats, has outlined details of a version of the 737 Max which increases this capacity. Ryanair has ordered the aircraft, designated the Max 200, with a layout featuring 197 seats. ■

FLEETS DAVID KAMINSKI-MORROW LONDON

Icelandair sizes up with 767s for Heathrow service

Icelandair Group is to introduce a pair of Boeing 767s for its mainline operation and Bombardier Q400s for subsidiary Air Iceland.

The mainline airline is using 24 Boeing 757s for its services this year – including one -300 model – but says it will bring in two 767-300s next year, to be deployed on the London Heathrow-Reykjavik route. The two 757s it leases are due for return this autumn.

"Operating one type of aircraft has been very economical for Icelandair," says chief executive Bjorgolfur Johannsson. "But when the route network and the fleet reaches a certain size it becomes more feasible to have a broader range of aircraft in the fleet."

Larger aircraft will allow the airline to cope with higher load factors and slot constraints at particular airports, the group states,

while the 767's longer range will "create new opportunities for the route network".

It says the 260-seat 767s will be brought into the mainline operation in spring 2016. Icelandair's 757-200s have 183 seats while its -300 has 220.

The carrier has already opted to diversify its fleet by ordering the 737 Max, which it will receive from 2018.

Icelandair Group is also intending to divest Air Iceland's five Fokker 50 turboprops and acquire three Q400s to replace them.

The change will mean Air Iceland will have an all-Bombardier fleet, also including two Q200s.

Icelandair says this means the operation will be "simplified and optimised" through using a single airframer, while the Q400's speed and range will give the carrier the chance to serve new destinations.

"The company will be better equipped to service the domestic market as the aircraft are larger and travel time will be shorter," it adds. "The airline aims to increase the number of foreign tourists on board its aircraft."

Icelandair Group has yet to decide whether it will purchase or lease the additional aircraft. Leasing subsidiary Loftleidir already has 767s in its fleet. ■



The 757s that currently make up Icelandair's fleet will be joined by 767-300s and 737 Maxes



UK defence chiefs
apply positive spin
DEFENCE P18

ENGINES STEPHEN TRIMBLE WASHINGTON DC

GE9X reveals new hybrid composites

Manufacturer takes technology to next level by blending carbon and glass fibres to strengthen fan blade for 777X engine

Carbonfibre-based composites first migrated into production-rated turbofan engines 20 years ago out of necessity. The sheer size of the GE90-94B made it impossible to design hub-mounted dovetails to be large and strong enough to contain a solid metal fan blade. GE had already experimented with carbonfibre blades on a cancelled open rotor engine programme, so that became the material of choice for all GE fan blades.

That was the first step in a steady, two-decade obsession with advanced materials by the Cincinnati-based engine manufacturer. The original planar blades of the GE90-94 soon gave way to the bowed and forward-swept shapes made possible by the carbonfibre material and three-dimensional, aerodynamic design techniques.

The next major step in the progression of composite materials is now under way with development of the GE9X. The unprecedented 335cm (132in) diameter of the front fan will test the strength of any design, but especially with a record low total of 16 blades doing all the work. GE has previously described the GE9X as featuring a “fourth-generation composite” blade, intentionally obscuring – until now – a new breakthrough.

The engine that powers the Boeing 777X will be the first to incorporate a hybrid composite fan blade, blending both carbon and glass fibres into the same part.



Using a new mix of materials in the GE9X will result in weight savings for the long-range twinjet

“Now we’re looking at carbon and glass fibres in the same resin system,” says Nick Kray, a consulting engineer on composites for GE Aviation. “It’s our first step in hybrid composites.”

Unlike a monolithic carbon-based composite material, hybrid composites blend two or more materials into the same component. That enables GE’s designers to tailor the material properties along the blade.

Airworthiness requirements imposed by the US Federal Aviation Administration make it clear

that the biggest threat to a front fan blade is bird ingestion. No matter how long or wide a fan blade is, the material must survive a sudden encounter with a large bird at high-subsonic speeds.

The GE9X will feature the longest and widest-chord fan blades yet inserted into a turbofan engine, so GE needs more strength than provided by standard carbonfibre material to pass the bird ingestion test.

“Carbonfibre has a certain failure strain,” says Kray. “They can strain to a certain percentage and they’ll break. The glass actually has a higher strain capability. So it’s not as stiff. It’s allowed to flex more before it fractures.”

Between 5 and 10% of the GE9X fan blade will be composed of glass fibres rather than carbon fibres, Kray says, but that represents only a starting point.

Other combinations of materials are possible in future applications. Instead of only glass, GE could integrate different forms of carbonfibre – such as unitape, braids and weaves – into different areas of the same fan blade, Kray says.

Such hybrid materials are also not limited inside an engine to the fan section. The large frames inside the fan case bear heavy structural loads, and so must remain metallic. “Your flow path surfaces which are not heavily loaded could be composite,” he says.

EXPOSURE

In the future, hybrid composites could be developed to replace areas of a turbofan engine normally reserved for high-temperature metals. A large portion of the compressor section inside the engine core is exposed to temperatures between 200°C (392°F) and about 425°C.

“If I have a high-temperature composite, that certainly would up my design space in that part of the engine as well,” Kray says.

It took about 25 years of dedicated research and experimentation before GE was comfortable replacing metallic surfaces in the turbine shrouds and combustor liners with lighter ceramic matrix composites. A similar timeline may be necessary to reach a state of maturity for high-temperature composites, Kray says. ■



GE has been developing advanced materials for two decades

ROTORCRAFT DOMINIC PERRY RAF BENSON

UK defence chiefs apply positive spin

Minister's claim of 'world-class helicopter fleets' glosses over incomplete status of upgrades and procurement questions

With the UK's 7 May election just weeks away, defence minister Philip Dunne – speaking at the Royal Air Force's Benson base in Oxfordshire on 12 March – delivered a verdict on the nation's defence helicopter fleet that felt somewhat incomplete.

Having spent £6 billion (\$8.9 billion) over the last four years on upgrading four of the UK's five main rotorcraft types to "bring them into the 21st century", he said, the UK now possesses "world-class helicopter fleets".

Dunne is not alone in holding that view, with Pete Worrall, the Ministry of Defence's chief of materiel (joint enablers), describing the component as "one of the most capable and technologically advanced fleets in the world".

INCOMPLETE

But scanning the five types on display, there was a sense of positive spin being applied, not least because the upgrade programme is only halfway complete.

Of the models on show, two or perhaps three can be considered as genuinely world class, while question marks remain over the others.

On the positive side of the ledger, the UK now possesses one of the largest fleets of Boeing CH-47 Chinooks outside of the USA. Enhancement work on the RAF's 46 older Chinook HC2 and HC3 variants under the Project Julius initiative – which adds new avionics and engines to bring them to the enhanced HC4 and HC5 standards – has progressed smoothly.

With little over a year of the programme left to run, Boeing says it has delivered 32 of 38 HC4s, while upgrade work on the eight HC3s has begun. Six of an eventual 14 new-build HC6-model aircraft have so far been delivered, and the remaining eight will be handed over by October. Initial operating capability (IOC) was declared for the new variant in January, based on three operational aircraft.

AgustaWestland's AW159 Wildcat programme is also broad-

ly considered a success. The Army Air Corps' AH1 model reached IOC status last August, followed by the Royal Navy's HMA1 version in January. A combined 39 Wildcats have now been delivered to the services, from a total buy of 62, and their older Lynx airframes will undergo phased retirement before leaving use in 2017 and 2018, respectively.

It is a mixed picture, however, for the UK's AgustaWestland AW101s. Enhancement of the RN's HM1 anti-submarine warfare fleet to the new HM2 standard under the Merlin Capability Sustainment Programme is well advanced, with 10 of a total 28 airframes still to undergo conversion at the company's Yeovil site in Somerset.

The MoD expects to make a preferred bidder selection during the second quarter for the supplier of airborne surveillance and control system equipment which will be installed on eight Merlin HM2s under its Crowsnest requirement. Lockheed Martin and Thales are vying for the £500 million contract to replace the navy's current Westland Sea King 7s.

Air Vice-Marshal Julian Young, director, helicopters at the UK's Defence Equipment & Support procurement body, says the timeline for introducing Crowsnest by 2018 "will be tight", but that he is confident "we will deliver that on time and on budget".

Of the maritime Merlin, Young notes: "There has been some quite



Enhancement work on older Chinooks has progressed smoothly

marked improvement in availability and reliability. An awful lot of the challenges are behind us".

AgustaWestland has also started the process of converting 25 former RAF Merlin HC3/3A troop transports to an HC4 standard for use by the navy's Commando Helicopter Force, with the first airframes already at its Yeovil facility. The company will deliver an initial seven in an interim configuration with folding rotor blades and a folding tail, with later examples to also gain the same all-glass cockpit as the HM2 variant.

Simon Jones, vice-president of UK government business at AgustaWestland, describes the work – worth £478 million to the company – as "fairly straightforward" and "well-rehearsed". "I'm not anticipating any major issues at all, because both elements of the upgrade have been done on previous programmes," he says. "The first seven will be done quite quickly."

Meanwhile, just one of a total of 24 Airbus Helicopters Puma HC2 transports remains to be upgraded for the RAF. Crews are enthusiastic about the capabilities the new engines and avionics have delivered, and a deployment of three aircraft to Afghanistan is a sign of confidence.

DURABLE

The vintage Puma is something of an oddity alongside the rest of the UK's inventory, however. The majority of the original HC1 fleet was delivered in the early 1970s, according to Flightglobal's Ascend Fleets database, but the MoD sees the type as remaining in service until at least 2025.

No replacement is currently planned, but there seems little concern at present, despite the notoriously long length of procurement programmes. "That date is 10 years away," notes Young. "There will be a plan, an assessment whether we need that capability in the UK armed forces."

The final piece of the puzzle will become apparent next year, when the government of the day will choose a preferred bidder for the replacement or upgrade of the army's Boeing AH-64D-based Apache AH1 fleet to an E-model standard. But with AgustaWestland already issuing thinly veiled warnings about the future of its Yeovil plant if work does not come its way, it will be anything but a simple decision. ■

UK PROGRESS TOWARDS FUTURE HELICOPTER FLEET

Type	Service	Deliveries	Final fleet
AH-64E Apache	Army Air Corps	0	50
AW101 Merlin HM2	Royal Navy Fleet Air Arm	18	28
AW101 Merlin HC4	Royal Navy Fleet Air Arm	0	25
AW159 Wildcat AH1	Army Air Corps	27	34
AW159 Wildcat HMA1	Royal Navy Fleet Air Arm	12	28
CH-47 Chinook HC4	Royal Air Force	34	38
CH-47 Chinook HC5	Royal Air Force	0	8
CH-47 Chinook HC6	Royal Air Force	6	14
SA330 Puma HC2	Royal Air Force	23	24
Total		120	249

SOURCE: Ministry of Defence/manufacturers



F-35 emerges abroad as first Italian model rolls out
DEFENCE P21

PROCUREMENT CRAIG HOYLE LONDON

US missile policy in crosshairs over Brimstone offer

Rejection in 'test case' for access to market would hurt Washington's claims on competition, says MBDA official

MBDA is awaiting a decision from the US government on whether to order its Brimstone air-to-surface missile, with the company's chief executive warning that a rejection would call into question the openness of Washington's acquisition policy.

Speaking about the European company's inability so far to meet growth targets for its MBDA Inc unit in the USA, Antoine Bouvier says: "The most significant opportunity we could have short-term is the Brimstone, for some US customers."

A UK-developed weapon capable of striking moving ground targets in all weather conditions from fixed-wing aircraft and unmanned air vehicles, the dual-mode seeker-equipped Brimstone early last year completed a bilateral firing campaign from a Gen-

eral Atomics Aeronautical Systems MQ-9 Reaper in the USA. A potential order for the missile has been the subject of discussions between British Prime Minister David Cameron and US President Barack Obama, industry sources confirm, with production to be performed at MBDA Inc's Huntsville facility in Alabama.

"We are ticking all the boxes," Bouvier says. "We have made a very attractive financial proposal. We have negotiated to have the transfer of some important responsibilities – including the design authority – to the US partners."

"If we are not able in the next few weeks to confirm that we have entered into the US market with the dual-mode Brimstone we will have to recognise – not just MBDA, but the UK and the European defence community –



The MQ-9 Reaper is one potential platform for dual-mode weapon

that if we have failed to enter with such a perfect case then there is something wrong about accessibility," he said during a results briefing in London on 16 March.

"The stakes are high; not only for MBDA, but also for the defence industry of Europe, because this would not be the first time that we could be rejected."

Bouvier believes a rejection by Washington "could also be a negative element for the USA, because it would have a much weaker credibility with the nice political statements about accessibility to the market and competition if such an excellent product and an impeccable offer doesn't work".

Referring to the current offer as a "test case", Bouvier concludes: "I am not over-optimistic." The company "cannot be absent from this market", he notes, but adds that if its proposal is unsuccessful, "we will stay, but in a way which will be reassessed".

Meanwhile, MBDA has been given a study contract by the UK to test the integration of Brimstone with a rotary-wing aircraft, with a suitable test platform now being sought.

"I'm optimistic that within the next nine to 12 months we will have done firings," says Dave Armstrong, who will assume the post of MBDA UK managing director on 1 April. ■

DEVELOPMENT GREG WALDRON SINGAPORE

KAI strengthens rotorcraft partnership with Airbus

Airbus Helicopters has been selected to help Korea Aerospace Industries (KAI) develop a 5t-class rotorcraft to meet Seoul's requirement for a light civil helicopter (LCH) and light armed helicopter (LAH), beating an AW169-based offer from AgustaWestland.

Both variants will be based on the European company's H155; formerly designated as the EC155. The selection by KAI will help to extend the life of the product, which from 2018 is set to be superseded by the new H160 model.

A key part of the deal is the transfer of technology from Airbus Helicopters, in order to help South Korea further develop its aerospace industry.



South Korea's new helicopters will be based on Airbus's H155

"The LCH and LAH programmes will build on our collaboration with Korea Aerospace Industries on the Surion, which has become a reference in suc-

cessful rotorcraft collaboration," says Airbus Helicopters chief executive Guillaume Faury. "By continuing our relationship, we will significantly reduce the risks

of these two new development programmes, while meeting all of the mission requirements."

To be suitable for emergency medical services, coastal surveillance and VIP transport duties, the LCH will enter service in 2020, while the armed LAH will follow in 2022. The latter will replace types including the Bell AH-1J/S and MD Helicopters MD500 for South Korea's army. Flightglobal's Ascend Fleets database records the service as operating a respective 77 and 252 of these types.

The programme has an expected development budget of 1 trillion won (\$884 million), with the funds to come from the South Korean government and overseas investors. ■



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Debut deal gives
C-Series its Flymojo
SHOW REPORT P23

REQUIREMENT BETH STEVENSON LONDON

Berlin scans its SIGINT fleet options

MQ-4C Triton or adapted business jet could fill gap left by 2010 retirement of Atlantics and cancellation of replacement

Germany is considering starting a programme to explore the MQ-4C Triton maritime variant of Northrop Grumman's Global Hawk unmanned air vehicle or a converted business jet to fill a signals intelligence capability gap created by the retirement of its Breguet Atlantics in 2010.

The German air force had intended to replace the manned aircraft with the Global Hawk-derived Euro Hawk, but cancelled the project because of escalating costs that arose while attempting to integrate the high-altitude, long-endurance UAV into the nation's airspace.

A solution based on the MQ-4C would overcome a series of challenges that the Euro Hawk faced, such as meeting requirements for de-icing, some form of sense-and-avoid capability and communication links compatible



Northrop Grumman

Integrating the Euro Hawk into German airspace proved too costly

with developing air traffic management standards. However, a manned business jet would be easier to gain certification for, and to operate on a routine basis.

"It will not be the same in terms of capability, but it will be able to fly where we want it to," a German air force operational forces command representative told Defence IQ's Airborne ISR

and C2 Battle Management conference in London. "I see no problem in integrating this [manned] capability into the airspace, as long as we can obtain a certificate to fly."

The official adds that UAV technology has advanced since the Euro Hawk development effort began for the German armed forces in 2000, and that un-

manned systems "are much safer than they used to be".

Berlin is expected to make a decision on a possible competition by the end of 2015, and to resume testing the Euro Hawk's sensor suite in a series of trials.

The Airbus Defence & Space-developed payload did not reach completion under the previous contract and flight testing using the programme's one prototype, but if fully developed it could in theory be transferred over to the selected aircraft.

"A migration onto the new platform would be explored at a later date," the official says.

"The MQ-4C is an easier air fit, but we still need to develop the sensor. We are trying to re-use the aircraft that is sitting in Germany. The plan would be that by the end of this year, beginning of next, we'd start flight tests of it again." ■

ASSEMBLY DAN PARSONS WASHINGTON DC

F-35 emerges abroad as first Italian model rolls out

The first Lockheed Martin F-35 built outside of the USA rolled off the final assembly and check out (FACO) line at Cameri air base in Italy on 12 March.

Conventional take-off and landing aircraft AL-1 is the first of eight now on the Alenia Aermacchi-run line, and will be flown for the first time later this year.

The 101-acre facility – which currently employs 750 people – features 11 final assembly stations. In addition to completing F-35As and short take-off and vertical landing F-35Bs for the Italian air force and navy, it also

will deliver aircraft for the Netherlands, and use remaining capacity for other European programme partners, Lockheed says.

As a FACO owner, the Italian defence ministry also has agreed to take over heavy airframe maintenance, overhaul, repair and upgrade for European F-35s by 2018, using five stations.

Meanwhile, Alenia Aermacchi is set to ship its first Cameri-produced wing assembly for the F-35 to Lockheed's Fort Worth final assembly site in Texas. The company is to supply 40% of the wings for all A-model examples. ■



Lockheed Martin

Aircraft AL-1 is the first of the type to be built outside the USA

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LIMA 2015



Greg Waldron/FlightGlobal

The Langkawi International Maritime and Aerospace (LIMA) exhibition was anything but sleepy this year, as Bombardier stunned the show with a 40-aircraft letter of intent for the CSeries from new Malaysian carrier Flymojo, covering 20 orders and 20 options for the CS100. Kuala Lumpur's long-running fighter requirement faded into the background, with the focus instead shifting to maritime surveillance aircraft and light attack helicopters. Greg Waldron reports

REQUIREMENT

Light attack rivals showcase designs

Boeing and MD Helicopters were among manufacturers courting defence officials as Malaysia contemplates new capability

Malaysia could be edging closer to the acquisition of a light attack helicopter, with Boeing and MD Helicopters having showcased the capabilities of their respective AH-6i and MD530G designs.

Making its debut LIMA appearance, MD Helicopters brought a single MD530G, which participated in flying displays and also took Malaysian defence officials on test flights.

Craig Kitchen, chief commercial officer, Middle East and Europe, claims that the model would be substantially cheaper to obtain and operate than the rival AH-6i, due to its simpler avionics

and mission systems. "Over time, expensive systems can be hard for foreign militaries to maintain," he says. In addition, the MD530G is available through a direct commercial sale, whereas an AH-6i buy would be conducted through the US Foreign Military Sales mechanism, he notes.

Although the types appear similar visually, as the AH-6i is a

heavily modified derivative of the MD500, Dave Brostrom, a business development executive in Boeing's vertical lift business, says the model has several key advantages.

The AH-6i has a six-bladed main rotor and a four-blade canted tail rotor, while the MD530G uses a respective five and two configuration.

Boeing says its design offers superior control characteristics, particularly in hot and high conditions, while Brostrom also refers to features such as crash-resistant seats, self-sealing fuel tanks and a greater ammunition load-out.

Bell Helicopter's contribution to the show included a US Marine Corps UH-1Y utility helicopter, while Sikorsky's stand featured a model of an armed UH-60 Black Hawk.

Malaysia is looking at a number of options for its requirement, ranging in scale from buying between eight and 24 aircraft, but it is currently unclear whether the nation has sufficient budget for an acquisition.

Several other countries in the region are also understood to be interested in acquiring a new light attack helicopter capability, including Bangladesh and the Philippines. ■

Malaysia is looking at a number of options, ranging in scale from buying between eight and 24 aircraft

PROPOSAL

MiG-29 upgrade plan puts MRCA contest in doubt

A unit of the Malaysian maintenance, repair and overhaul firm Airod has proposed an upgrade programme for the nation's fleet of 10 RAC MiG-29 fighters.

The work, which an industry source says is being considered by the Royal Malaysian Air Force, would see the type modified to a "MiG-29NM" standard.

It is not clear how receptive Kuala Lumpur will be to the proposal. For several years, fighter manufacturers have been positioning for its multi-role combat aircraft (MRCA) requirement, which is expected to lead

to the MiG-29s being replaced with 18 new aircraft. However, the government has yet to issue a request for proposals, and funding remains a challenge.

The MiG-29NM being proposed by Airod's Aerospace

Technology Systems Corporation, in conjunction with Malaysia's Sukhoi Technical Centre, would receive a new fire-control radar and improved avionics, while airframe life would be extended to 6,000h from a

current 4,000h limit. A conformal fuel tank is also proposed for installation aft of the cockpit, which the partners say would increase operational range by 30%.

Modernisation work would be performed under licence in Malaysia under the offer.

For the first time in several years, the air force did not send any of its MiG-29s to appear at the show. Industry sources refer to low serviceability of the type, which has been due for retirement this year, and note that the service is reluctant to use its aircraft for non-essential duties. ■



Greg Waldron/FlightGlobal

Proposed enhancements include a conformal fuel tank



PlaneSense joins
the jet set with
Nextant 400XTis
BUSINESS AVIATION P24

LIMA 2015
SHOW REPORT

START-UP

Debut deal gives CSeries its Flymojo

Bombardier wins first commitment for narrowbody in Southeast Asia as new Malaysian airline opts for up to 40 CS100s

New Malaysian carrier Flymojo has signed a letter of intent with Bombardier for up to 40 CS100s. The agreement comprises firm orders for 20 aircraft and options for 20 more, with list prices suggesting that the deal could be worth up to \$2.94 billion if fully realised.

Malaysian prime minister Najib Razak presided over the signing ceremony, which represented the first major commercial order announced at a LIMA show. The commitment is also the first CSeries order in Southeast Asia.

Flymojo, which has attained its air operator's certificate, says it hopes to start flying as soon as possible, as a "value" carrier. No specific details have been provided about the selected configuration for its CS100s.



The new carrier hopes to start flying soon as a "value" operator

The carrier plans to operate from hubs in Johor Bahru and Kota Kinabalu, and initially operate a mix of domestic and international routes. It hopes to launch services in the third quarter of this year with three CRJ aircraft, says Flymojo managing director Janardhanan Krishnan. The company is in discussions

with Bombardier about these aircraft, which will be leased.

Flymojo hopes to take delivery of its first CS100 in early 2016, although the exact delivery time-frame is under discussion with the Canadian manufacturer. Malaysian certification also will be required before services can commence. Krishnan says the

carrier looked at several types before deciding on the CSeries, also including the Airbus A320 family, Boeing 737, Embraer E190 and Sukhoi SuperJet.

Krishnan declines to detail Flymojo's ownership structure, saying only that it is "100% privately owned by Malaysians". A core group of managers has been hired, and the carrier will start hiring operations personnel such as pilots and cabin crew from later this year.

The carrier's decision to operate a hub from Johor's Senai International airport stems from the massive investment that has taken place in the southern region of Malaysia over the last decade, explains Krishnan, adding that he also believes Kota Kinabalu is a "huge market". ■

See Feature P30

REQUIREMENT

Bidders react as Malaysian maritime patrol contest reaches the surface

Kuala Lumpur is in the process of crystallising a requirement for six to eight long-range maritime patrol aircraft (MPA), according to industry sources, with its need having prompted manufacturers including Boeing, Dassault, Indonesian Aerospace and Saab to promote their products at the show.

Boeing displayed its Maritime Surveillance Aircraft technology demonstrator on the static line, and briefed officials about its capabilities. A modified Challenger 605 business jet, the design is optimised for high-altitude, broad-area surveillance.

Indonesian Aerospace, which put forward its CN235 MPA, says it is working on mounting torpedoes under the aircraft's wings, and also at adding two more of the weapons in a recessed cavity under the fuselage. It notes that the twin-tuboprop's rear ramp is

useful for dropping life rafts and survival equipment during search and rescue missions. An Indonesian navy-operated CN235 was on static display.

Dassault is offering a maritime patrol variant of its Falcon 2000 for Malaysia, while Saab is backing its 340-based Maritime Surveillance Aircraft and Saab

2000-derived Swordfish MPA. Alenia Aermacchi also promoted the ATR 72MP variant of the ATR 72-600 at the previous LIMA show in 2013.

Malaysia currently has limited maritime surveillance capabilities, with its air force operating just four Beechcraft King Air 200s in this role. ■



Boeing displayed its modified Challenger 605 on the static line

SURVEILLANCE

Grob looks to restart Egrett production

Grob Aircraft brought its G520T Egrett high-altitude surveillance platform to the show, as the European company considers restarting production.

The two-seat aircraft was operated by Australian researchers through the 1990s and early 2000s, but was grounded in 2007 due to a lack of funds. It was recently purchased and returned to flight by Grob Aircraft, which says it will restart production of the Honeywell TPE331-engined type with new avionics and other updates if it receives six confirmed orders. Talks are under way for a potential 12 orders, it adds.

Company representatives met with military officials to discuss the G520T's utility as a high-altitude observation platform. The aircraft can fly at 50,000ft with a payload of cameras, radar arrays and scientific equipment. ■



COMPLETIONS

Jet Aviation wins BBJ 777-300ER project for Basel

Boeing Business Jets has selected Jet Aviation to complete two BBJ 777-300ERs at its facility in Basel, Switzerland. Work on the widebody airliners, owned by an undisclosed Asian customer, will commence imminently and the project is expected to take over three years to complete.

"We have invested heavily in process and product improvements for popular widebody platforms such as the 777, in order to bring VIP interiors to the next level of quality and precision," says Jet Aviation Basel's director, market development Matthew Woollaston. "This is a fantastic opportunity for us to showcase our new capabilities," he continues.

According to Flightglobal's Ascend Fleets database, there are four VIP 777s in service today, two of which are operated by the Abu Dhabi Presidential Flight and the remainder by the government of Gabon and Turkmenistan Airlines.

In addition, three BBJ 777s are on order, two for undisclosed customers and the third for the Saudi Ministry of Finance. ■

AIR TAXI KATE SARSFIELD LONDON

Linear Air plots expansion with \$2 million investment

Charter provider set to market online booking platform to piston-engined aircraft operators

Linear Air is seeking up to \$2 million of investment to fund a marketing campaign, designed to raise awareness of its online booking platform among the USA's lucrative piston-engined aircraft operator community.

The goal of the Concord, Massachusetts-based charter operator is to double this sector's annual revenues from \$500 million to \$1 billion and eventually roll out the booking platform globally.

This strategy marks a change of direction for 10-year-old Linear Air, which is one of the early adopters of the Eclipse 500 very light jet. "This business has been relatively successful," says William Herp, founder and chief executive of Linear Air, which operates a handful of the VLJs under management. "But it is not a growth business any more," he explains.

"We had high hopes for Eclipse 500 in the beginning," Herp adds, in reference to the company's original plan to establish a pan-USA point-to-point air

taxi service with a fleet of the six-seat type. "This model was predicated on Eclipse Aviation producing high volumes of aircraft and keeping the acquisition costs low. The company collapsed [when the downturn hit] and the new owner [Eclipse Aerospace] only produces small numbers of aircraft a year."

Herp says travellers are now turning to small, propeller-driven aircraft such as the Cirrus SR22 for low-cost flexible travel. "The SR22 is the fastest-growing fleet in the air taxi market with over 100 operators to date," he says. The four-seat piston single is significantly cheaper to operate than a light business jet, or even a turboprop, he argues, "and their appeal is widespread".

To confirm Herp's confidence in this niche sector, Linear Air has set a target of 1,000 trips to be booked through its platform this year – nearly three times the tally for 2014.

To help reach this goal Linear

Air is seeking to raise between \$1 million and \$2 million in funding from individuals and angel investors. This will finance a marketing campaign to raise awareness of the air taxi market and Linear Air's online booking system. "We will close the funding round on 2 April and start campaigning in earnest soon after," says Herp.

Linear Air is focusing on companies along the northeastern corridor initially – six of which have already been added. "Our plan is to expand our operator profile to include all the providers of [Part 23] piston-engined aircraft charter in the USA," says Herp.

This sector generates \$500 million in revenue annually, Herp continues. "By raising awareness of these operators and helping them, through our booking platform, to absorb a fraction of their idle aircraft capacity, we can grow these billings to \$1 billion a year," he adds. ■

ACQUISITION KATE SARSFIELD LONDON

PlaneSense joins the jet set with Nextant 400XTis

US fractional ownership provider PlaneSense has acquired up to five Nextant 400XTis, which will mark its first foray into the business jet and multi-engine market when the first two light twinjets are handed over in the second and fourth quarters of 2015.

Founded in 1995, PlaneSense is one of the oldest fractional ownership providers in the USA and the largest operator of the Pilatus PC-12 in the world, with 32 of the single-engined turboprops in its single-model fleet. "Historically we have acquired 52 PC-12s, but we have cycled older models out of the fleet," says PlaneSense founder and chief executive George Antoniadis. "The



The first two light twinjets are scheduled for delivery this year

aircraft remained popular even during the economic downturn. It's a strong part of our identity."

PlaneSense illustrated its faith in the Pilatus product line in May 2013 with a launch order for six PC-24 light business jets, the first of which is scheduled

for delivery in 2017. "We would have bought more if we could," says Antoniadis.

Pilatus has notched up 80 orders for its \$9 million, clean-sheet twinjet – equivalent to the first three years of production. "We intend to buy more PC-24s

when the orderbook is opened again in 2020," Antoniadis says.

In the meantime the 400XTi – a remanufactured and re-engined Beechjet/Hawker 400A/XP – will provide a transition between the PC-12 and the PC-24. "The aircraft will give our existing customers more range and higher speed [than the PC-12] and open up a market to new clients," Antoniadis says.

The jets will probably be used as core aircraft rather than be split into fractions and sold to its customers. "They could be used as an upgrade path, whereby PC-12 owners who want to travel longer distances in the XTi, trade in 1.8h for an hour in the light jet, for example," Antoniadis says. ■



Back on course
SPECIAL REPORT P26

PERFORMANCE DAN THISDELL STEVENAGE

Airbus consolidates its place in space

Demand from communications and Earth-observation markets contribute to 'best year ever' for European manufacturer

The clean room at Airbus Defence & Space in Stevenage, UK, is a busy place. When *Flight International* visited in mid-March, some engineers were turning the final screws on the structure and thermal model of the European Space Agency's Solar Orbiter, while others were busy building the Sentinel-5 Precursor Earth-observation satellite and Aeolus, which will study Earth's wind from space.

A visit just a couple of weeks earlier would also have found LISA Pathfinder, now in Germany for pre-launch testing en route for deep space, to search for Einstein's elusive gravitational waves.

Elsewhere in AD&S, well-documented difficulties in the A400M military transport programme and the ongoing weakness in military spending in Europe have left the division lagging behind the group's civil airliner and helicopter businesses, with 2014 revenue dipping by 1% to just over €13 billion (\$14 billion) as EBIT slumped 38% to €409 million. But all this activity in Stevenage – and at sites in Germany and France – gives credence to remarks made by chief executive Tom Enders during his 2014 results presentation in Munich last month, that the space part of the business had its best year ever.

That top performance included launchers activity: the Ariane 5 rocket flew nine times in 2014 and will repeat that feat this year. But these are also bullish times in the satellites unit, which designs and builds spacecraft for the telecommunications and Earth-observation markets, along with scientific spacecraft such as Solar Orbiter – and ESA stars including comet-chaser Rosetta and Gaia, launched in December 2013 and now mapping the Milky Way in unprecedented detail. As unit chief executive Eric Beranger tells *Flight International*, 14 sales in 2014 included four telecoms satellites, nine for Earth observation and one scientific, giving the



Scientific spacecraft such as Solar Orbiter have kept the unit busy

business nearly a quarter of the world telecoms market by value (a sector led, for launches, by Ariane 5), putting it at number two behind Space Systems/Loral.

"It was a very good year in commercial terms," he says.

CONNECTED

Given the obvious global hunger for communications services, it is no surprise to find times are good for a leading maker of orbiting hardware. But Airbus is also feeling market momentum in the Earth-observation and scientific markets. Of the nine Earth-observation spacecraft sold in 2014, three will go to customers outside Europe, making Airbus the world's number-one exporter. That is a position it has held for "many years" and which Beranger regards as "extremely important" to retain, by maintaining sales to institutions like ESA and national programmes.

Earth observation is becoming a big business, and not just for military and security purposes. Airbus is good at that – its in-development GO-3S platform will be capable of streaming real-time video from geostationary orbit with 2.5-3m resolution – and success breeds success. The GO-3S capability is built on optics technology Airbus developed for Gaia.

That sort of cross-innovation is a key strength at Airbus, as highlighted by the Sentinel series, which are the space-based components in the EU's ambitious Copernicus Earth-monitoring programme. Where super-precise optical performance in extreme temperatures is a priority, projects going back 20 years to Rosetta's origins have relied on silicon carbide, one of the company's technology trump cards and possibly the best raw material for structures that absolutely must retain their shape and dimensions.

"We're starting to ask: 'What would happen if we switched [long-term programmes] off?'"

RALPH CORDEY
Earth-observation business manager,
Airbus Defence & Space

Speaking in February at IABG in Ottobrunn, near Munich, where the Sentinel-2A multi-spectrum ground-mapping satellite had finished testing and was being readied for shipping to a 12 June launch in French Guiana, AD&S head of Earth observation, navigation and science Michael

Menking stressed that silicon carbide – of which the Stevenage site is a key producer – is a good example of how a "standardised" technology can be reused, which provides some certainty as to performance and helps keep costs under control.

SERIES

But the best way to control costs is what amounts to series production. As Menking observes, Sentinel-2A cost €240 million, but the identical -2B unit will cost just €100 million.

Sentinel-2A, the -1A radar unit launched in 2015 – and B units for both – are the first of a series of complementary missions that will end with Sentinel-6, to be launched in about 2020. Back in Stevenage, Airbus Earth-observation business manager Ralph Cordey, who used to handle scientific projects including Solar Orbiter, says the continuity represented by the Sentinels is an indication of how the space age has reached maturity.

The trend now, he says, is to "operationality", which means a shift from "one-offs" that prove a concept to long-term programmes such as Sentinel, which are ongoing business. Today, Cordey is talking with scientists and agencies about spacecraft that will be launched in the mid-2020s, and even the 2030s: "There is a continuity in the business that we haven't seen before."

The line-up of spacecraft in the clean room is proof enough of that continuity, which applies to scientific missions as much as to long-running programmes such as Sentinel, says Cordey. "We're starting to ask: 'What would happen if we switched them off?'"

The answer is that switching off would spell trouble for scientists and service providers like weather forecasters.

As a result, he says, Airbus is enjoying good business in building long-term components of our "scientific infrastructure". ■

BACK ON COURSE

The confidence of Canada's aerospace industry has been dented by uncertainty over government procurement and mounting concerns at Bombardier caused by delays to the flagship CSeries programme. However, the country remains one of the most important aerospace economies, with world-leading companies and important niche players. Bombardier firmly believes its narrowbody – and corporate prospects – are again on track as its CSeries flight test and sales campaigns ramp up ahead of certification. Meanwhile, small-engine specialist Pratt & Whitney Canada has been boosted by programme successes. Landing gear manufacturer Héroux-Devtek has joined the top table following its successful ousting of UTC on the Boeing 777X, while Canada's "other OEM", Viking Air, has struck a winner with its reborn Twin Otter. In this country special, we also profile avionics business CMC and special missions conversions house Field Aviation





Twin Otter is making a splash in market



Héroux-Devtek opens its new factory



Subassembly of P&WC's PW306

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TURBOPROPS

Canada's other OEM

Vancouver Island's Viking has transformed itself from MRO to manufacturer of a remarkably successful reborn aircraft

MURDO MORRISON VICTORIA

About as far west as you can go from the aerospace corridor around Montreal and Toronto and the Twin Otter's original manufacturing site, Canada's other original equipment manufacturer is proving its gamble to bring the type back to life is more than paying off. Viking Air – based on Vancouver Island on the country's Pacific coast – has notched up more than 110 orders for the former de Havilland Canada high-winged, twin engine turbine powered aircraft since launching the Series 400 programme in 2007, and has delivered almost 70.

This achievement makes Viking, a private-owned former maintenance, repair and overhaul facility, one of the most prolific aviation manufacturing start-ups of the modern era. The business model has worked, says Evan McCorry, vice president international sales and marketing, because the company has set itself modest and achievable production targets – “the plan was never to build a whitetail” – and there is plenty of demand throughout the world for a rugged transport or utility aircraft able to take off and land over a short distance and on almost any surface.

With 99% of sales exported, Southeast Asia, followed by South America, Europe and Africa are its biggest markets. “We are active in developing nations where infrastructure is not good,” says McCorry. “The Twin Otter can land on anything.”

MARKET DEMANDS

From its facility at Victoria airport, Viking will build 24 aircraft this year – one every 10 working days – although McCorry says this can be raised to 60 a year “if the market demands”. The first Series 400 was delivered in 2010 and the backlog is 15 months, but there are some earlier production slots for those willing to pay a premium.

Before launching the Series 400, Viking bought the type certificates to all the legacy de Havilland types, except the Dash 8, from Bombardier. With up to 600 of the 844 original DHC-6 Twin Otters still in operation – production ended in 1988 – and the type renowned for its longevity and residual value, McCorry admits that “we are in a way com-

peting with ourselves, as it was built so well. People fly them for 30 years.” This year marks the 50th anniversary of the Twin Otter's first flight. “I've just been to Peru and serial number three is still in service there,” he says.

Viking's story is not one of a visionary entrepreneur out to change aviation overnight. For decades after its formation in 1970, Viking – named so by its then-Norwegian owner – made a modest living from MRO, repairing Grumman flying boats active in the Pacific northwest. It moved into build-to-print parts manufacturing, for Boeing-owned de Havilland Canada and Bell Helicopter (which it still supplies).

When Bombardier bought de Havilland and production of all models apart from the Dash 8 ended, Viking negotiated a deal to sell parts for the DHC-1 through to the DHC-7 directly.

Eventually, in 2006, Viking took over the type certificates, effectively making it the responsible OEM for all aircraft in operation. The company then carried out research into whether there was a viable market for a fresh version of the Twin Otter. It concluded there was, and the Series 400 was born with upgraded Pratt & Whitney Canada PT6A-34 engines, an integrated Honeywell Primus Apex digital avionics suite and, says McCorry, “800 other modifications”. However, the basic all-metal, non-pressurised airframe design remained the same.

Turning from an aftermarket player into a fully-fledged manufacturer was a challenge. The company had to size up for a start,



About one in seven Series 400 Twin Otters are sold as amphibians



The aircraft are assembled in Calgary

quadrupling its work force to 600 employees – 450 of whom are based in Victoria, and the rest in Calgary. There is also a geographically-spread production chain, with fuselages built in Wichita by Lee Aerospace and the wing, nose and tail by Viking in Victoria. All are shipped to a four-station final assembly line at Calgary, where flight-testing is done. The aircraft then go to Spokane, Washington, for painting and back to Victoria for completion and customer deliveries.

Canadian firms feature in the supply chain, with Fleet in Ontario responsible for the empennage, and local British Columbia firm Sealand Aerospace the flaps. Montreal-based Héroux-Devtek provides the landing gear and Field Aviation in Toronto partners on a multi-role surveillance variant of the aircraft, the Guardian 400, which Viking has high hopes for. Outside Canada, Viking works closely with float manufacturers including Wipaire – around one in seven aircraft are supplied as



Viking Archive

amphibians, with operators in the Maldives and Papua New Guinea among its customers.

One of the Twin Otter's strengths, says McCorry, is its popularity across a range of sectors, including military and other government use. "It's the number one utility aircraft in the world, engaged in everything from parachute jumping to medevac to ISR [intelligence, surveillance and reconnaissance] to troop transport," he says. "For the ISR market, people want to loiter. The [rival Beechcraft] King Air is too fast. The Twin Otter flies at 180kt but can fly slower, and is comfortable at 5-6,000ft. That's a sweet spot for ISR."

CHALLENGE

However, penetrating the North American defence market remains a challenge. Viking has had little success there, despite legacy Twin Otters being "in service with every branch of the US military". "Part of the challenge has been awareness," admits McCorry, who has appointed four US representatives, partly to promote the product to the defence community. Similarly, convincing Ottawa, another legacy operator, of the benefits of the Series 400 is a priority. All McCorry will say is that "we are engaged in a couple of projects with the Canadian military".

In terms of markets, 24% of Series 400s are in service as airliners "on wheels" – Viking classes amphibian use separately. A similar number are used for commercial or industrial support – everything from shuttling workers to remote sites to monitoring. The next biggest sector is government transport and medical

evacuation. One of the Twin Otter's advantages, however, is its flexibility, says McCorry, noting that in Peru, for instance, the customer is the air force, but the aircraft is used to provide essential passenger and cargo transport to remote Amazon communities.

McCorry is expanding its global sales network of 27 agencies and "upgrading" the way Viking deals with customers by taking on regional directors to oversee local representatives. "It's a different approach to the big OEMs who do it direct, but we are selling a \$7 million aircraft, not a \$55 million one," he says. Chinese certification is a target. "We're working hard," says McCorry. "We have several deals lined up, two or three that you'd know by name. With the airport expansion going on there, the Twin Otter is ideal to fly in equipment while they are building runways."

The no-nonsense, unpressurised Twin Otter is never going to win an award for the most luxurious ride in the skies, but Viking has also dabbled in the VIP market. A privately-owned aircraft was on display at the NBAA business show in 2013 fitted with Wipaïre floats and an executive interior also by the St Paul, Minnesota-based company. The aircraft featured a four-place club layout with 12 standard seats. Viking believes there is a market for such a variant in the luxury resort market, where top-end tourists have to be transported between small islands.

Although Viking owns the rights to all the de Havilland types, a proposal to reintroduce the DHC-5 Buffalo appears to have stalled. However, McCorry says the company is still

"studying" the sector after considering a similar upgrade to the Twin Otter, with P&W PW150 engines and a modern cockpit. The twin turboprop, certificated in 1965, was never as prolific as the Twin Otter – 110 were delivered before production was stopped in 1988 – but several remain in service with commercial operators, as well as militaries, including Canada's, and the United Nations.

DIVERSE

With the Series 400 fleet growing and a diverse customer base, another focus for Viking has been training and parts support. The company is planning to open a new training school next to its Victoria facility in 2016. This will offer a level four simulator with the ability to offer seaplane instruction, and operate 24/7. FlightSafety has the only other Twin Otter simulator at Downsview, Toronto, near the original de Havilland site, but "we hope the market will be big enough for us both to compete", says Michael Coughlin, chief executive of Pacific Sky, a sister company to Viking that will run the centre.

Introducing new operators to the type and assessing their training and support needs is the job of entry into service manager Rob Parker. "Of all our customers, about half are new to the Twin Otter," he says. "As the balance of our sales shifts to emerging markets, we are finding more customers who have never operated one before." This brings its challenges. "There are cultural and language and timezone problems you just don't have with a largely North American installed base," Parker says. "The guys who need most support are often on the other side of the world and don't speak English."

Getting parts to a worldwide operator base is another challenge for a small OEM, says Jeff Humphreys, operations manager for Viking's aftersales business, which supports legacy de Havilland types as well as Series 400s – around 1,500 aircraft in total. "We put a big focus on our processes, getting to know our customers and anticipating the needs of our customers," he says. These range from "a sophisticated airline with all the infrastructure such as TMA in the Maldives to a guy in Alaska doing fishing charters with a Beaver, who doesn't have email and still sends faxes."

World's aerospace capital Seattle is a ferry ride away – but Vancouver Island, with its pretty inlets and wooded mountains, is more the Canada of the picture postcard than the blue-collar heartland in the east. Despite being one of British Columbia's largest private employers, Viking is a "boutique company, a hidden gem", says marketing manager Angela Murray. Its prospects look good as it continues to find new customers around the globe for a type considered obsolete almost three decades ago. ■

PROGRAMME

Counting on CSeries

Canada's aerospace champion has had a torrid year. With CS100 and CS300 now flying, can its flagship finally deliver for Bombardier?

MURDO MORRISON MIRABEL

A visit to Bombardier's newly-expanded Mirabel complex, just north of Montreal, does not give the impression of a company in crisis, although the past few months have seen a succession of grim news stories about Canada's biggest manufacturer. Even local taxi drivers fret about the company's problems and the effect major job losses would have on the economy in greater Montreal, long the country's aerospace hub.

In the past year, Bombardier has replaced its chief executive, axed an entire organisational tier and hundreds of jobs, shelved a business jet programme – the Learjet 85 – and sold its military training unit. In addition, the aerospace and rail transportation group has faced speculation it will have to offload larger parts of the business and even join up with a major investor to stave off a cash crisis caused by the cost of developing both the delayed CSeries and two Global business jets.

However, in Mirabel, where the CSeries is being flight tested and built, there was a joy de vivre about the factory when we visited. The reason was that the CS300 – the larger CSeries variant represents three-quarters of the order-book – was about to take to the air for the first time. On 27 February, the 135-seater joined four – shortly to be five – smaller CS100s in the flight test programme, with total airborne hours now well into four figures.

The fifth CS100 will be the first to fly with a full interior, while a second CS300, also with interior fitted, will join the flight test programme in the next few months. Together the two CS300s will have to complete around 800h of flight testing, as part of a total programme of 2,400h – some of this likely to be completed using a simulator. Bombardier has just finished full-envelope testing of the fly-by-wire system in normal mode and flown the aircraft at Mach 0.91 at 41,000ft. "We were only going to go to M0.89, but the aircraft handles really well, so we opened the envelope," says Rob Dewar, vice president, CSeries.

CONFIDENT

Bombardier is still confident it can meet its final quarter certification target for the smaller variant with the CS300 following into service six months later. "The CS300 has not been so impacted," says Dewar, of the delay that grounded the CS100 flight test fleet for 100 days last year. "In fact, we've shaved six months off the gap." Bombardier had originally intended for the larger variant to enter service a year after its smaller sibling.

Away from the runway, preparations are under way for volume production of the two small Pratt & Whitney PW1500G-powered narrowbody airliners. The first production CS100, P1, is structurally complete and will begin flight testing in the autumn. P2, the seventh CS100 to be built, is in final assembly and P3 is at the beginning of assembly. "In the middle of this year, we will gate with our suppliers," says Dewar. "They are all committed in terms of a one-year delivery schedule."

The final assembly hall will have capacity

"At the Paris air show we will demonstrate how serious we are about the programme"

MIKE ARCAMONE

President Bombardier Commercial Aircraft



The CS300 flew for the first time in late February

for six aircraft, three on each of two lines, with capacity at full-rate production expected to be 120 aircraft per year, or nearly one every two working days. Despite the CSeries's troubles, there is a clear sense of achievement among Bombardier executives about finally getting the first new narrowbody programme from a manufacturer other than the big two to this stage. From a gallery corridor two floors up overlooking the hall, Dewar smiles: "Two months from now that will be full, with six aircraft in final assembly."

Delivering the aircraft to the certification authorities on schedule is one challenge. Another that will be also causing Bombardier's directors sleepless nights is hitting a sales target of 300 aircraft by entry into service, and keeping that momentum going as re-engined alternatives from Airbus and Boeing become available. Bombardier insists its all-new design is more efficient than its rivals, but its first-mover advantage has been eroded by delays and the speed with which Airbus and Boeing responded to the CSeries launch with their re-engined A320 and 737.

The Airbus variant the CSeries competes the most closely with – the A319neo – is not selling strongly, despite Toulouse branding it a "CSeries killer". However, what must worry Bombardier is that with just 243 firm orders as we went to press in mid-March (180 for the CS300), the aircraft has failed to drive a large enough wedge between the largest regional jets – especially Embraer's E2 family – and the even more strongly selling re-engined larger narrowbodies from Airbus and Boeing. What Bombardier hoped would be a significant new segment has scarcely so far materialised.

Mike Arcamone, president Bombardier Commercial Aircraft, understandably continues to be bullish. Speaking to Flightglobal in



Bombardier prefers creative solutions, rather than a stretch version, for the Q400



Bombardier

his Mirabel office, he acknowledges that breaking the Airbus/Boeing duopoly was always going to be a challenge, but says the CSeries “speaks for itself” as a unique aircraft. “It is the only product in this market segment. We are beating our promises to our customers in terms of performance.”

Flying the CS300 alongside its smaller sibling for the first time was “a very important milestone”, he says, signalling to customers and potential customers that the programme is “in the last lap”. Bombardier plans to display the CSeries at Paris in June, its debut at a major air show, although it does not specify which model or how many. “At Paris we will demonstrate how serious we are about the programme,” he says.

Bombardier’s travails do not, of course, just stem from lack of revenue from its flagship programme – under the original schedule, cheques would have been pouring in by now for CSeries deliveries. By investing so much

in the new aircraft, Bombardier has left itself unable to develop – beyond tweaks – either its CRJ regional jets or its Q400 turboprop, which is being outsold by European rival ATR.

RESERVES

Equally, on the business aviation side, while its new large Globals – the 7000 and 8000 – will sell well in a niche market, developing the new variants has also drained Bombardier’s cash reserves, and they will arrive on the market later than their main competitor in the ultra-long-range, large-cabin stakes, Gulfstream’s G650ER. Meanwhile, the sluggish recovery of the light to mid-size segments prompted Bombardier to suspend its all-composite Learjet 85 in January, almost a year after its first flight, and has thrown into question the future viability of the whole Wichita-based Learjet business.

Bombardier Commercial Aircraft’s vice president business acquisition Ross Mitchell

insists the CRJs remain a strong proposition with production running at about 46 a year, with a backlog of 15 months. The CRJ900 is the workhorse in the USA – because of scope clauses and the fact that most operators stick at 100 seats since going over that requires a third cabin crew member – and makes up 90% of production.

However, with scope clauses being relaxed, the larger CRJ1000 is beginning to gain traction and Mitchell expects it to make up around a quarter of deliveries by next year. “This is the aircraft that is going to give higher economies to airlines and the ability to offer more classes,” he says. Any suggestion that Bombardier’s regional jets are last-generation is firmly rejected by his boss, Arcamone. “We are constantly doing tweaks on the aircraft. We want to dispel some myths about it,” he says.

Similarly, Arcamone says creative solutions for the Q400 are a better strategy than developing a larger turboprop – a route ATR is also veering from. “There is no need to stretch the Q400,” he says. “The aircraft, like all our products, has an enhancement strategy which is driving new interest from customers.” Among these ideas are a cargo-combi version of the aircraft and an 86-seat option pitched mainly at the Asian market. “In Asia, it’s all about high capacity. We think this is the answer to our competition there,” he says, predicting a “breakthrough for sales” this year.

Of course, no-one expects aerospace executives to be anything less than upbeat about the prospects of their products, but the fact that the CSeries – a programme on which the whole future of Bombardier is likely to depend – is finally on the way to making money will be causing considerable relief in the corridors of Mirabel and Dorval. To paraphrase Churchill, having both CSeries variants in the air and production aircraft nearing completion may not be the beginning of the end of Bombardier’s woes, but it looks like it may be the end of a very troubled beginning. ■

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HÉROUX-DEVTEK

Gearing up for 777X

Snatching the deal to supply the landing gear for Boeing's new widebody from incumbent UTC was a coup for Canadian firm

MURDO MORRISON CAMBRIDGE, ONTARIO

Two years ago, Héroux-Devtek was a distant number three in the civil landing gear market, behind Safran's Messier-Bugatti-Dowty (MBD) and the former Goodrich business of United Technologies (UTC). In most cases it supplied the big two with components rather than vying with them for prime contracts in its own right. Despite a heritage that included the then-Héroux supplying Grumman with the landing gear for the Apollo 11 lunar module, outside Canada and the landing gear community, few in the wider aerospace world would have even heard of the company.

However, that changed in late 2013 when Héroux-Devtek – based in Longueuil, a suburb of Montreal – snatched the contract to design and manufacture the main and forward landing gear for Boeing's new 777X, as well as current 777 models, from UTC. It had previously supplied the US company with landing gear pistons for the large widebody. Chief executive Gilles Labbé describes the win as “the most important landing gear contract in Héroux-Devtek's history”.

The decision took many by surprise, including, possibly, Labbé himself. He told us, when we visited for our Canadian special two years ago, that despite a strong position as a tier one contractor in business, regional and some military aircraft and as a tier two supplier for large commercial jets, Héroux-Devtek knew its limits. “With aircraft of less than 100

seats we think we can compete directly,” he said. “But in the 100-plus seat market, we team with the big boys.”

To mark its accession to the big league, Héroux-Devtek last month inaugurated a 10,000m² (108,000ft²) factory in Cambridge, Ontario as its new “centre of excellence” for assembly of the 777 landing gear in the company of officials from Boeing and local politicians. Construction on the greenfield plant, near Héroux-Devtek's existing plant in Kitchener, began in June 2014 and it will become operational this June – most of the industrial tooling is still to be delivered. Between then and January 2017, when the contract formally changes hands, Héroux-Devtek will continue to supply UTC.

Some believe the decision to vault Héroux-Devtek up the supply chain was taken as a warning shot to large contractors such as UTC: that Boeing is prepared to drop you if the price is not right. At the opening, Labbé acknowledged that there had been doubts that such a large arrangement could be undertaken by a relatively small business like Héroux-Devtek – it turned over C\$272 million (\$215 million) from continuing operations in the last financial year – but that the company was ready to deliver.

SWITCHING

Speaking at the ceremony, Boeing's vice-president and general manager of supplier management, Ken Fisher, acknowledged that switching tier one suppliers on a programme such as the 777 was a “big decision”, adding: “You can't imagine how much planning has gone into this. I'm counting on you.” With a current backlog of 550 777s and 777Xs, he told the assembled Héroux-Devtek staff: “I hope you like to be busy. We're going to be very busy over the next few years.”

Héroux-Devtek is investing C\$54 million in the new plant, which will manufacture outer cylinders, main truck beams and the nose outer cylinder. The province of Ontario



Héroux-Devtek won the 777X landing gear deal from long-term incumbent UTC

provided C\$7 million. That support from the government is essential, acknowledges Labbé, who admits the company looked at alternative sites in Mexico, the US and elsewhere in Canada before settling on Cambridge, part of a cluster of industrial towns, one hour's drive west of Toronto.

Proximity to its Kitchener site, which employs around 200 staff, was crucial as Héroux-Devtek wants to tap into a pool of trained workers. Cambridge will employ another 40. The plant will assemble the structures from components trucked in from Héroux-Devtek's newly expanded factory over the border in Cleveland Ohio, and finished products will be shipped to another new plant next to Boeing in Everett, Washington, where Héroux-Devtek will open by the end of this year a further 2,000m² facility for final assembly of landing gear. By 2017, output is expected to be 100 shipsets a year.

Labbé holds open the prospect of a doubling in size of the Cambridge site on the back of additional work from Boeing or another airframer. The company has secured adjacent land and one of the walls has been built in such a way that it can be moved to accommodate any extension. “We will be pursuing other options,” says Labbé, who led a management buyout of the then-\$12 million turnover business in 1986 and is the major shareholder.

Labbé has led a transformation of Héroux-Devtek in recent years. After adding the Devtek business in 2000, the company slimmed by a third in 2012 when it sold its largely build-to-print aerostructures division to US company Precision Castparts. According to Labbé, the move gave the company focus and allowed it to invest in developing its own engineering intellectual property, essential to win tier one contracts to design and deliver to large airframers. The business is highly profitable, recording bottom-line earnings at more than 13% of sales in its 2014 fiscal year just ended.

The company's sales currently remain



Local politicians help Labbé (centre) formally inaugurate the new site



slightly skewed towards the military market, where it has original equipment and aftermarket work on the likes of the Boeing CH-47 Chinook, Lockheed Martin C-130J Hercules and Sikorsky CH-53K King Stallion. A year ago, it added to its capabilities in the military fixed-wing and rotorcraft market when it acquired for \$124 million from BBA Aviation Runcorn, UK-based APPH, which operates from four sites in the UK and one in Wichita, Kansas and has 400 staff, including 40 engineers. APPH's contracts include the Saab Gripen, AgustaWestland AW101 and the BAE Systems Hawk and the business's turnover in the 2013 calendar year was around \$77 million.

The 777 contract is not the first time Héroux-Devtek has pulled off the unexpected. When it secured the contract to supply the landing gear on the new Dassault Falcon 5X, which was launched in 2013, it was the first time the French company had opted for a supplier other than MBD. Proving its worth on the 777 will allow Héroux-Devtek to compete on an equal footing with UTC and MBD for further big-ticket landing gear contracts. The builders could soon be busy again extending the new Cambridge factory. ■

FIELD AVIATION

A special mission

Engineering and delivering highly specialist conversions, especially of Bombardier aircraft, has given Toronto firm an enviable niche

MURDO MORRISON TORONTO

For almost 70 years, Field Aviation has been turning mainly Canadian-built types into special mission platforms – making, as its website boasts, “ordinary aircraft extraordinary”. The modifications house, based next to Toronto's international airport, began transforming surplus wartime transports in the late 1940s. Its latest projects include partnering with Boeing on its Bombardier Challenger 650-based Maritime Surveillance Aircraft (MSA) and designing and installing a first-of-type cargo door on a new Bombardier CRJ700.

Field's is a niche business: contracts rarely

involve more than a tiny handful of aircraft. But its expertise and reputation means it handles some high-profile and prestigious projects, and MSA in particular could lead to bigger things. In 2013 Field carried out substantial structural changes to install sensors, radar equipment and other mission equipment on the Challenger 604 MSA demonstrator unveiled at last year's Farnborough air show. Boeing is pushing the aircraft (dubbed, unkindly perhaps given its capabilities, the poor man's Boeing P-8 Poseidon) at export markets.

Although Boeing has not yet sold any aircraft, the manufacturer has identified up to 30 potential customers and carried out a number of demonstrations in the Middle East, Africa and Asia. Any deals would likely mean further work for Field, which carried out its own post-modification ground and flight test programme prior to its Farnborough appearance. That work would be carried out in Toronto, with any extra capacity being provided at a new facility in the USA.

ACQUISITION

That site is the result of an acquisition announced on 10 March, days after we visited, of Rockwell Collins' Arinc Aerospace Systems Engineering and Support (ASES). The Oklahoma City-based business provides modification, integration and maintenance, mostly focused on large military airframes including the Lockheed Martin C-130 and Boeing KC-135, and will now trade as Field Aerospace. Field chief executive John Mactaggart says ASES's business focus will complement the Canadian operations.

Field has been part of Cincinnati-based Field Aerospace – formerly investment house Amavco – since 2012. “When we purchased Field Aviation, we wanted to use the company as a launching point for further acquisitions, particularly in the USA,” says Mactaggart, who adds that the combined capability of both businesses “will allow Field to expand its product offerings from a small turboprop all the way up to the largest of jet aircraft.” Chairman Dan »



One of Field's converted Bombardier types: a Q300 for Japan's Coast Guard

» Magarian adds: “Expanding into the US market was always a primary objective and this purchase begins that process in a way that supports our current operations as well as our strategic growth plans.”

MULTIMISSION

Another key current programme for Field – again involving a Bombardier aircraft – is a modification including a 1.83m x 1.27m left-side cargo door on the CRJ700 to turn the regional jet into a multimission combi. Field has been working on the engineering for a year and will take delivery of a green aircraft in May, with a planned completion date of May 2016. Although again a one-off for an unnamed customer, Field has ambitions to market its capability. “Our ambition is to do a scaleable design which we can tailor to any CRJ,” says programme manager Inder Semi. “We hope it will spur further activity.”

Currently on the shop floor at its Toronto facility is the first of four Challenger 604s Field is modifying for Cobham, which will from 2016 provide an airborne search and rescue capability for Australia’s Maritime Safety Authority. Again, Field is installing a radome and other mission systems. Other contracts have included upgrading directly or through a third party six Bombardier Dash 8 aircraft with new flight-decks, designed by Field.

It is legacy Dash 8 variants that represent the vast bulk of the company’s modification output. Field has adapted almost 40 of the

Bombardier turboprops for special mission applications, the latest a maritime patrol Q300 for the Japan Coast Guard (JCG). The aircraft – delivered early last year – is the ninth JCG aircraft Field has completed as part of a programme that began in 2007. The modification includes a missionised interior, large observation windows and an air operable rear cargo door, vertical hatch and launcher tubes to give the aircraft an air drop capability. Surveillance equipment includes a 360° surface search radar and a stabilised electro-optical infrared turret.

The company also has links with another former de Havilland Canada type, the Twin Otter, back in production with Viking Air of Vancouver Island. Field produces airframe parts for the lower fuselage and main landing gear at its factory in Calgary, and worked with the manufacturer on developing a multirole surveillance variant, which has primary sensors installed in its nose section, with the antenna for the search radar installed below the nosecone.

Field’s chief commercial officer, Brian Love, says the company’s “innovative and creative engineering design methodology” has made it a “world leader in the modification of aircraft in ISR roles”. He adds: “The future looks bright. We have, through our recent acquisition, created a company with considerable resources and skills in special mission aircraft modification, and with a much broader range of airframe expertise than we once possessed.” ■

ESTERLINE CMC

Cockpit of change

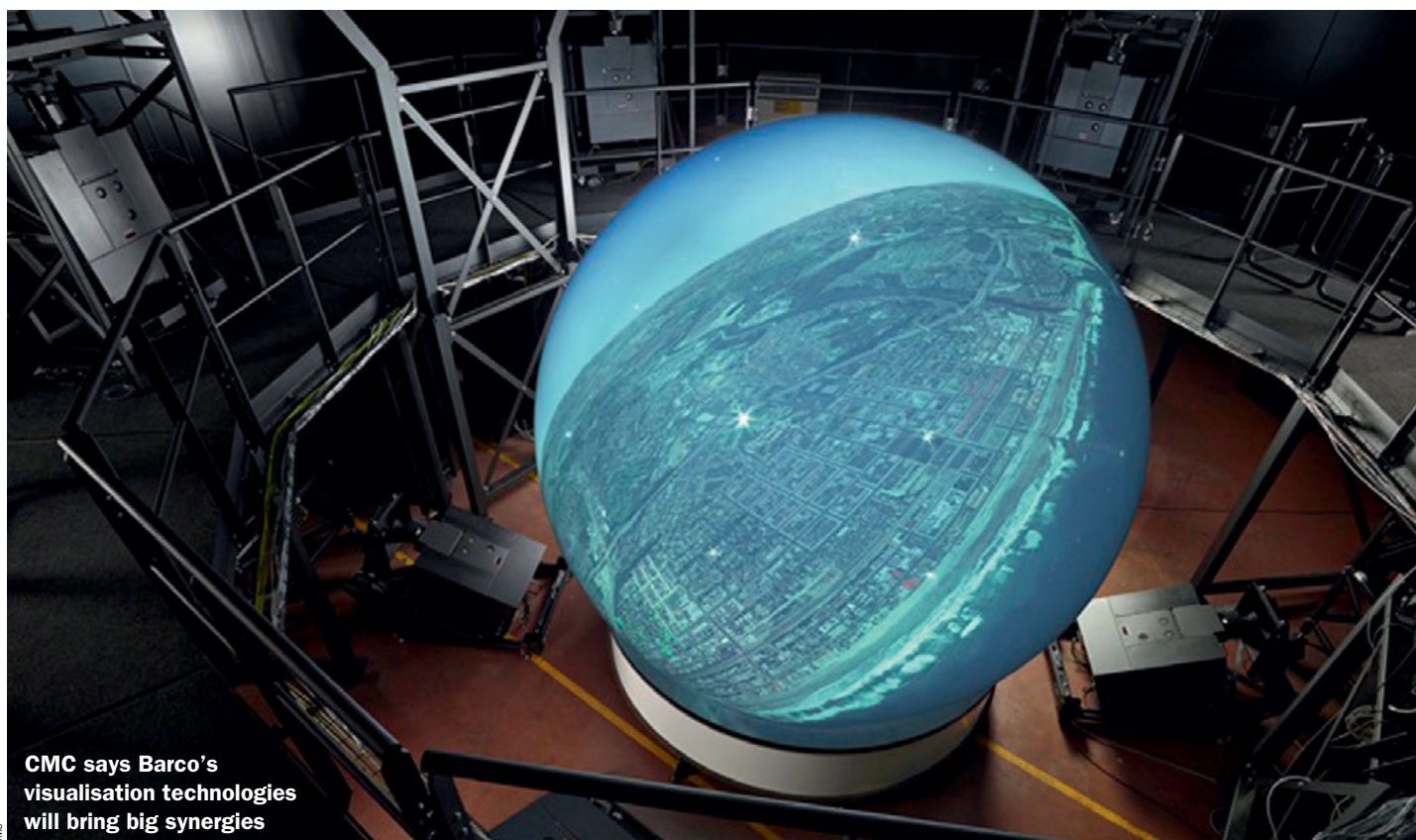
Esterline’s acquisition of part of Barco gives the US group’s Canadian business some exciting new technologies to bundle

MURDO MORRISON MONTREAL

Canadian avionics house CMC has more tools in its box these days as it strives to position itself as a first-tier integrator. This January’s acquisition by its US parent Esterline of Barco’s defence and aerospace division will broaden existing product offerings for the Montreal-based business, as well as introducing entirely new technologies.

The acquisition, announced last year, sees Barco – which provides visualisation products across a range of markets – exit aerospace and defence, and its \$200 million-revenue portfolio in those areas split between Esterline CMC, which gets the avionics, and another Esterline business unit based in Everett, Washington, which takes on defence and air traffic control displays.

“The synergies are huge,” says Claude Chidiac, vice president customer support and strategic development. Although CMC produces



CMC says Barco's visualisation technologies will bring big synergies

its own cockpit primary displays and multi-function control display units, for instance, Barco provides an “injection of a broad product line” and new customers, particularly in Europe, where the Belgium-based firm is well established, he says. As part of the package, CMC will also gain a repair facility in the region for the first time.

SOLUTIONS

Although the increased product offering will help push CMC up the value chain by allowing it to bundle different solutions to compete with the likes of Honeywell or Rockwell Collins as a prime for integrated avionics contracts, the business is also content to operate as a tier-two, says Chidiac. Among its customers at this level is Honeywell, for whom it supplies GPS receivers for the Primus range of glass cockpits.

However, CMC has also had success selling directly to original equipment manufacturers. At Heli-Expo earlier this month, it announced that its CMA-9000 flight management system and its CMA-5024 GPS landing system sensor had been selected as the navigation system for the new Airbus Helicopters H160 (previously the X4).

CMC – which traces its roots to the Marconi Wireless Telegraph Company of Canada, set up in 1903 and later named Canadian Marconi Company – has been part of \$2 billion-turnover US defence contractor Esterline since 2007. Although it is fully integrated, CMC remains a distinct brand within the business.



CMC's avionics line-up includes PilotView

CMC is split roughly 50/50 between defence and civil customers, such as Montreal-based airline Transat



In terms of markets, CMC is split roughly 50/50 between defence and commercial applications. “We have always tried to maintain that split,” says Jean-Michel Comtois, vice president government sales and public affairs. “Defence is very much alive for us.” CMC remains well-positioned in the trainer market, for example, where it supplies the integrated cockpit on the Beechcraft T-6B, which is being pitched at a number of potential international customers.

CMC is also focused on emerging markets, such as the one for low-cost intelligence, surveillance and reconnaissance platforms in regions such as the Middle East and North Africa. It supplies much of the technology, including the Cockpit 4000 avionics suite and integration of sensors including an electro-optical/infrared camera, on the Iomax Archangel-armed ISR aircraft – based on the Thrush 710P two-seat crop duster – that was unveiled at the Paris air show in 2013.

“It’s effectively a manned UAV,” says Comtois: a low-cost airframe that has “state of the art sensors and can fire munitions”. He adds: “It means Middle Eastern and North African countries which have a need to patrol their borders and territories can send this aircraft to hover for six to eight hours at 15,000ft at a fraction of the cost of a [General Atomics Aeronautical Systems] Predator. It is easy to operate and maintain and has opened up a whole new segment for us.”

Sweeping changes in communications, navigation, surveillance and air traffic management systems (CNS/ATM) also present an opportunity for CMS both in the commercial and military sphere, says Comtois. “The upcoming mandates in Europe in 2017 and 2020 in North America are requirements for which we have products,” he says. “Over the next five years we expect to make major progress with customers who need to update avionics to stay within the controlled airspace of the future.” ■

FLYHT

Plotting the future

Recent airliner losses highlighted a need for better communication systems, a segment this Calgary business has served for 12 years

DAVID LEARMOUNT LONDON

Calgary-based communications specialist Flyht did not need events like the loss of Air France flight 447 or Malaysia Airlines MH370 to persuade it that airlines’ connectivity with their aircraft could beneficially be improved. It has been producing intelligent on-board satellite communications systems since 2003, and if either or both those aircraft had been fitted with one of these, the airline operations departments – and emergency services – would have had a great deal of instant information about the nature of the anomaly the aircraft and crew faced, and an accurate picture of the aircraft’s location.

Years later, in its report into the June 2009 loss of AF447 in the South Atlantic ocean, the French investigation agency BEA recommended a system for ensuring flight data was recoverable and aircraft location notified in the event of deep-sea accidents. This sounded like a commercial for Flyht’s AFIRS event-triggered onboard voice and data satellite communications system, but traditional airline industry inertia ensured that although AF447 heightened risk awareness, it made very little difference to Flyht’s sales. Although this may have disappointed him, it did not faze Flyht president Matt Bradley because the company’s devices had been designed to enable airlines to have better day-to-day control over their aircraft assets and their engineering

AFIRS on Air France 447 would have been automatically triggered by pitch and roll variations to send information

» and operations requirements, rather than helping them to cope with disasters. But its real-time automatic occurrence/exceedance reporting system happened to make disaster management far more efficient too. Bradley points out that AFIRS on AF447 would have been automatically triggered to stream information back to base by the pitch and roll variations that began early in the departure from properly controlled flight, so hundreds of parameters about the aircraft's position, behaviour and systems health would have been received in real time until impact with the sea.

So when MH370 disappeared in March 2014, the message about the need for better base-to-fleet connectivity constituted a huge reproach to the industry for its failure to act. Then ICAO set up a task force on the need for oceanic flight tracking and has recently recommended automatic dependent surveillance reporting by all aircraft every 15min, but has left the method of implementing it up to the carriers. AFIRS, of course, would be one of the systems that could achieve this for the airlines, but rather more as well.

Meanwhile Flyht, according to Bradley, has learned from both AF447 and MH370. When the latter turned dramatically off its

flightplanned route over the Gulf of Thailand, that would not have automatically triggered a data stream at the time, but it would if it happened now. AFIRS communication, which includes voice communication as well as data via the Iridium satellite network, can be customised by the airline so it gets the operations and engineering data and exceedances it wants. Even the crew, if it is unhappy with an inflight development, can manually trigger data streaming back to base so they can access real-time advice for dealing with it, as well as setting up engineering and ops to be ready to deal with the problem on arrival.

FlyhtStream is a total airline customisable service that could replace or supplement ACARS (aircraft communications addressing and reporting system), and enable quicker responses to flight operations data monitoring, because the AFIRS box can act as a quick access recorder that can genuinely be accessed at any time. Back at base, engineering and ops can also interrogate AFIRS at any time, and can re-programme it too.

One of the issues under discussion at ICAO – and now at Flyht – is the possible need to tamper-proof reporting equipment like the aircraft's transponder and ACARS, because just before MH370 turned off its flightplanned route, its transponder stopped working, so it was no longer seen on civil radar. Bradley said Flyht, and the aircraft manufacturers, are debating whether circuit breakers for reporting equipment should be moved from the cockpit to the avionics bay. ■

P&WC

Powering ahead

Winning the engine contest for two new Gulfstreams last year is the latest in a series of successes for Canada's propulsion specialist

MURDO MORRISON LONDON

These are "exciting times" in the business aviation market for Michael Perodeau, vice-president of corporate and military aviation at Pratt & Whitney Canada. Although the sector has failed to fully recover from the global downturn at the turn of the decade, the Montreal-based manufacturer, one of the oldest brands in business and general aviation, has had a good run of success. Its products will power three in-development types due to enter service over the next four years.

In October 2014, its 15,000lb (67kN)-thrust PW800, based on the same core as the PW1000G geared turbofan that powers several commercial airliners, was confirmed as the exclusive engine for two new Gulfstreams, the G500 and G600 – beating a rival offer from long-time Gulfstream incumbent Rolls-Royce. It was a significant rebound in fortunes for P&WC after the powerplant's first application, the Cessna Citation Columbus, was cancelled

Could AFIRS have made a difference to the search for AF447?





Subassembly of the PW306 in Canada

Pratt & Whitney Canada

in 2009, leading to the engine programme being suspended.

However, P&WC quietly resumed development and testing, and its efforts were rewarded with the Gulfstream deal. It followed earlier wins on the Cessna Citation Latitude and Dassault Falcon 8X trijet with versions of its 4,700lb to 8,000lb-thrust PW300. Both programmes – the midsize Latitude and the large-cabin 8X, a 7X stretch – will go into service in the next 12 months. The 8X is powered by the PW307D, a version of the 7X's 307A, while the Latitude's PW306D1 is a variant of the PW306D on the Citation Sovereign.

The PW800 – which completed an unannounced first flight on a Boeing 747SP flying testbed in 2013 and received Transport Canada certification in February – has completed over 3,400h of testing, including 350h on the 747. "In the coming weeks these will continue to accumulate once the Gulfstreams start flying," says Perodeau. "Once that happens, our task will be mainly about supporting Gulfstream's flight test programme through to certification. But we are hitting our KPIs [key performance indicators]. These are exciting times," he says.

P&WC – founded in 1928 as an independent Canadian offshoot of the United Technologies-owned US engine maker, and its small-engine specialist – is now preparing for a production ramp-up of the new PW300-based engines for the 8X and Latitude as both aircraft enter production in the next 12 months or so. For now, P&W is delivering engines to support the flight test programmes. As both engines will run on the same line as the PW307A, there will be a minimum of upheaval as output gathers pace.

The Gulfstream deal consolidates P&WC's position in the large and ultra-long-range



Pratt & Whitney Canada

P&WC's latest offering: the PW800

"Now with the PW800 on the two Gulfstream programmes, we feel we are in a pretty good place"

MICHAEL PERODEAU
 Pratt & Whitney Canada

segment, which Perodeau describes as the "most robust" in the business aviation market. "Despite all the various economic challenges, it remains strong," he says. P&WC entered the large-jet space early this century with the Falcon 2000 and 7X programmes. "Now with the PW800 on the two Gulfstream programmes, we feel we are in a pretty good place," he says. "There is no reason to believe this segment won't remain robust."

By contrast, the very-light to medium segments – where P&WC engines power the Cessna Citation Mustang, the Eclipse 550 and the Embraer Phenoms – have been worse hit. However, Perodeau is confident they can recover. "The safest thing to say is that they have stabilised and the hope is that they will grow in future. The economic indicators have

been in the right direction for some while, so it's a question of what's holding the market back," he says, insisting: "It's a segment we will continue to invest in."

The mid-2000s saw enormous hype around the potential of very-light jets – at one point the original Eclipse Aviation had an orderbook for around 4,000 PW610F-powered Eclipse 500s, many of them from a new wave of on-demand air taxi start-ups. A confident P&WC supply chain had looked forward to a significant production increase. However, Perodeau claims that "while there were lots of very optimistic projections for thousands and thousands of sales, we didn't over-capitalise, so we didn't get left with a lot of unused capacity".

P&WC – which late last year pledged to invest more than \$1 billion on research and development after receiving a \$300 million loan from the Canadian government – has a range which extends from the veteran PT6 turboprop engine to the PW800 turbofan, although its Mirabel plant near Montreal will also assemble the Bombardier CSeries' PW1500G – one of the PurePower geared turbofan family designed by a partnership led by its Connecticut-based Pratt & Whitney sister business.

P&WC, which has 50,000 business and regional jet, helicopter and turboprop engines in service throughout the world, has also talked about long-term plans to develop a 2,000shp (1,490kW) turboprop engine, as well as variants of the PT6 with electronic engine controls. Perodeau acknowledges that the division is "always prepared to expand our power ranges if the right opportunity presents itself". He adds: "It is just a question of finding the right intersection of business opportunity and technology." ■

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Tintin takes to the skies again

Not only is he the most famous Belgian ever, but aviation was crucial to the Tintin stories. Hergé's illustrated children's books show the intrepid reporter, and often his comrade Captain Haddock, flying on classic airliners to adventures in Tibet, Latin America, the Gulf and the fictional Balkan kingdom of Syldavia.

One of the stories – featuring an eccentric billionaire said to be based on Marcel Dassault – is entitled Flight 714.

So it is perhaps surprising that it is only now that Belgium's flag-carrier of sorts, Brussels Airlines, has latched on to the iconic character (whose likeness is fiercely protected by the Hergé estate), with a livery on one of its Airbus A320s.

The design represents a great black shark, based on the submarine invented by Professeur Tournesol (Professor Calculus in the English version), and the painting was carried out by aircraft paint artist Andre Eisele in Ostrava, Czech Republic and took 1,500h in total. The special livery will remain until 2019.

\$65m Dollar bill

What do you do if you're a US televangelist with a track record of raising millions of dollars from your followers for good causes, and your 30-year-old Gulfstream GIII, used to spread the word around the world, has an unfortunate prang at Biggin Hill and is written off?



Qantas's first 747-400 lands for the final time, at Illawarra



Thundering typhoons: the A320 pictured at Toulouse

Simple: you release a video calling on your congregation to prove their faith by donating \$300 each to buy a \$65 million new G650 instead.

Creflo Dollar – yes, it's his real name – says Project G650, as it is called, is essential to continue his global ministry.

For some reason, not everyone seems convinced of the time machine/work tool argument for business aviation. "His congregation should tell him to fly coach," is one unkind Twitter comment.

747 heaven

Boeing's first 747-400 – celebrated for having flown the longest commercial flight in history, from London to Sydney in 1989 – has made its shortest, and final flight, 15min from Sydney to Illawarra Regional Airport in New South Wales on 10 March.

As we have reported before, after covering almost 85 million km in over 25 years of service, VH-OJA, or City of Canberra, was due to go into retirement at the Historical Aircraft Restoration Society, where it is now the only 747-400 in the world on public display.

The aircraft will live on in retirement very much as it was on its last flight, with the only items removed from the aircraft being the flight operations manuals, galley carts and fresh flowers in the lavatory – and the engines, which are in good condition and far from museum pieces. Replacements will be found in due course.

Re-re-engining

David Lye picks us up on a line in our Comment on the A380neo in the 3-9 March issue.

"Is there really a bandwagon calling for a re-engined A380?" he enquires. "Wow! We haven't even got an A380neo, yet already there's a bandwagon to re-engine it." He adds: "Sounds tautological to me, or extremely forward-looking."

Here's a glue...

Boeing has awarded Bostik with a Performance Excellence Award. The citation? "Thanks for sticking with us?"

Dread Zeppelin

We have had occasion to admire Count Zeppelin in the construction of his mammoth airships. But that they could ever be used to bombard towns, with but one object, the murder of non-combatants and destruction of property, never entered our minds.

Christened Crikey

It is greatly to be regretted that graphs of, and data for, the

newest service types are officially withheld. The only permissible

indication of the performance of our new fighters is that during contractors' trials one of them was dubbed "Crikey" by local residents.

Foam at last

Following a ten-day pause for inspection and adjustment of

the undercarriage, the prototype TSR.2 made a one-hour test

flight on Monday and landed intentionally on a blanket of foam. The water originally intended for this bad weather test had evaporated too fast. The TSR.2 will have made over 20 flights by the time these words appear.

Safety warnings

The Space Shuttle Assessment Team was

established after two events during the launch of Columbia last July,

when a short circuit almost forced the shutdown of one engine. In an unconnected event, hydrogen leaked from lines inside the main engine.



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Every issue of *Flight* from 1909 onwards can be viewed online at flightglobal.com/archive

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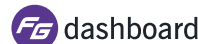
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AeroDef Manufacturing
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24 April

Skytech
Business Design Centre, London
skytechevent.com

29-30 April

Loyalty@Freddie Awards
Atlanta, USA
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1-3 May

Drones, Data X conference
Santa Cruz, California
nua.io

4-7 May

AUVSI's Unmanned Systems
Atlanta, USA
auvsishow.org

10-11 May

Aviation Africa
Dubai, UAE
aviationafrica.aero

13-14 May

Ascend Asia: Finance Forum
Singapore
flightglobalevents.com/ascendasia2015

17-20 May

ALTA CCMA
Punta Cana, Dominican Republic
alta.aero/ccma

19-21 May

EBACE
Geneva, Switzerland
ebace.aero/2015

26-28 May

AP&M Europe
Olympia London, UK
apmexpo.com

31 May - 3 June

**1st International Symposium on
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Istanbul, Turkey
issasci.org

4-6 June

France Air Expo
Lyon-Bron airport, France
franceairexpo.com

15-21 June

Paris Air Show
Le Bourget, Paris
siae.fr

30 June

Ascend Europe: Finance Forum
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17-19 July

Royal International Air Tattoo
RAF Fairford, Gloucestershire, UK
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18-20 September

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WORK EXPERIENCE ALEXANDER UITENBROEK

Talking the same language

As owner services manager for NetJets Europe, Alexander Uitenbroek looks after French, German and Russian-speaking clients for the business aircraft fractional ownership provider, and manages tactical communications

Tell us about your career

I began in the automotive industry. I worked for the exclusive importer for Vege reconditioned engines in Portugal. When I finished my degree in business and economics in 2003, I heard about NetJets through a friend employed in the flight services division. I was hired by NetJets in 2004 as a flight services co-ordinator, but I began to seek new opportunities. In my earlier years, one of my most challenging functions was as a tactical communications officer. I was responsible for communication with customers on anything that could have an impact to their flight.

What are your current duties?

I am manager for the owner services department for NetJets Europe based in Lisbon, Portugal. I have a specific focus on the international teams, which include the French, German and Russian-speaking territories. This department is tasked with managing customer interactions concerning flight reservations, daily flight management and general enquiries, being the first point of contact between customers and NetJets. I also manage the tactical communications team, who represent the customer service department in the operational control centre, liaising closely with the respective operations departments on daily operational decision-making regarding all situations/deviations that may affect NetJets customers. I'm also responsible for operational and customer escalations, depart-



Uitenbroek began his career in reconditioned automotive engines

mental and interdepartmental process creation and revision, operational management of a key alliance partner within the German market, financial monitoring and strategic planning.

What do you enjoy most about your job?

One of the most satisfying functions in my current role for me has to be the creation and revision of departmental, interdepartmental and intercompany processes (between NetJets in the USA and Europe). NetJets fully embraces constant improvement principles and by being involved in their execution with the different functional areas, I can obtain a broad scope and vision of the business. With this broader vision and understanding, I have become better equipped to per-

"We are focusing a lot of energy and time on improving our CRM tools. This is a huge undertaking"

form my current role and being able to influence and lead positive change is very gratifying. Another function in my role which I greet with equal fervour is management and interaction with staff in the owner services department. The calibre and dedication of the employees in NetJets is commendable and I consider myself very lucky to be a part of this pool of professionals. We are consistently learning and evolving

and this fast-paced environment really keeps us all engaged.

Has your role changed over the years?

Yes. In order to adapt to the market and because of the need to maintain a nimble and proactive business unit, there has also been an increase in our drive for continuous development to create a more global framework for the department and NetJets as a whole. By implementing a more global outlook, we can gain economies of scale and synergies where we may not have found them in the past.

What project are you working on now?

There are several projects in the pipeline. In the area of customer service, we are focusing a lot of energy and time on improving our CRM tools. This is a huge undertaking as it does not only touch upon the revision of tools used solely by the customer service area, but it links into all areas of the business globally that touch upon the customer, whether this is billing, sales or the pilots on the front line. It is exciting to see this drive for excellence daily and this is the main reason why I work at NetJets. ■



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